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AUDIO VISUAL

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in Instructional Films
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The Meaning of Title VII

THE JULY ISSUE OF *News and Reports** describing more than 80 Title VII grants comes as a reminder that almost two years of research on the new educational media under the National Defense Education Act is now behind us. What has Title VII accomplished? How is it influencing education? Where is it taking us?

As far as tangible achievements are concerned, a large number of individual grants have been made for research, and many of the studies are at an advanced stage. We also have the contract program under Part B of Title VII which already has to its credit several important regional research conferences and a wide range of dissemination of research projects.

The effects of Title VII on education is a little more difficult to assess. Obviously we cannot separate the influence of this program from that exerted by Ford Foundation activities or by other on-going research programs. It is however apparent that Title VII has stimulated researchers to concentrate their efforts on discovering relationships of educational media to instruction, thereby alerting the entire educational field to the implications of technological developments. This was a trend started by the Ford Foundation several years ago with its full-scale attack on the educational television problem. Title VII appears to be broadening the influence to include a wider array of media applications.

Where is Title VII taking us? Here the answers are even less clear. At least in its grant program, Title VII is limited by its dependence

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upon a system of voluntary project submission; the Office of Education cannot itself initiate the experimental study of necessary research. So it is not surprising to find almost half of the approved grants comparing the instructional effectiveness of the various media with conventional approaches to instruction. Nor is it surprising to note that about one-third of the grants have been made for the study of televised teaching. At the same time, an increase in the study of self-instructional approaches to learning and the production variables that lead to the design of these tools are a promising recent trend.

There remain as yet two significant gaps in the research coverage of the grant program, however. First, there is need for greater emphasis on the support of projects that investigate the application of total learning systems utilizing a variety of media combined in accordance with their unique instructional characteristics and for specific learning objectives. Second, some study is needed of factors relating to the administration and organization of education systems designed for the optimum use of all instructional media. Also worth considering is the fact that the possibilities of what may well be the most important instructional tool of all—the electronic computer—have as yet been almost completely ignored.

So the start that Title VII has made is encouraging. Its staff has been selflessly dedicated to the administration of the program. Hundreds of competent researchers are contributing to its success. The editors of AVCR wish to commend the Office of Education and the Advisory Committee on New Educational Media for their efforts in getting this difficult program in high gear.

William H. Allen, Editor

Audiovisumatic Teaching: A New Dimension in Education and Research

KARL U. SMITH

This report follows Dr. Smith's article in the Winter 1960 issue of AVCR. The research on audiovisumatic teaching reported here is an extension of the scientific principles of artistic illustration of teaching materials as treated in that article and as originally set down in THE BEHAVIOR OF MAN *(Henry Holt & Co., 1958) by the author and William M. Smith. This research on audiovisumatic teaching has been made possible by support from the National Science Foundation for a project on Perception and Human Motion and by funds provided by the Graduate School Research Committee of the University of Wisconsin.*[1] *A special report on the application of audiovisumatic teaching methods is available on request from the author. Dr. Smith can be reached at Indiana University where he is on leave from the University of Wisconsin as Ford Foundation professor of business administration.*

THIS PAPER describes the development and preliminary evaluation of a new method and approach to classroom teaching and educational research, to which we have applied the term, "audiovisumatic teaching."

Audiovisumatic teaching is a new concept and a new dimension at all levels of teaching—in individual tutoring, quiz-sections, discussion groups, and formal lectures. As a method of automation of teaching functions, it can be utilized by the individual teacher or in a teaching center. It is a new way to apply visual art and illustration to all aspects of oral teaching. It also provides the essential instrumentation for illustrated lecture review and machine control of programming and reinforcement in self-study.

[1] Numerical data analyses of some aspects of this research was aided by the Numerical Analyses Laboratory, The University of Wisconsin.

The term "audiovisumatic teaching" refers to the interrelated recording and playback of illustrated lectures and student control of programmed tutoring material. It involves the presentation of magnetic tape recordings and visual projection materials by means of flexible electronic controls. As adapted to self-study and review purposes, presentation of questions can be controlled in relation to answers given by the student. Audiovisumatic teaching devices maintain the "live" character of the oral lecture and automate presentation of supporting visual material. Far simpler and less costly to use than motion pictures or television in teaching, audiovisumatic methods probably achieve a more effective level and breadth of instruction than do these other specialized techniques. Yet audiovisumatic presentations, as well as the question-and-answer materials used by the student, can be prepared, recorded and presented by the average classroom teacher with no specialized technical training.

Audiovisumatic teaching makes possible many new techniques and practices in classroom procedure and educational research. The present study is concerned with an evaluation of some of these new methods and student attitudes toward them.

AUDIOVISUMATIC TEACHING DEVICES

The audiovisumatic teaching machine is a magnetic tape recorder with built-in electronic controls which can operate a conventional slide or filmstrip projector. In addition, the device contains an electronic control unit which is used to stop the tape recorder automatically after a question has been asked, and to start it again when the student correctly marks the answer to the previous question on an answer sheet.

Figure I illustrates one of our first audiovisumatic teaching machines which combines both lecturing and teaching functions. It can give an illustrated lecture, with slides automatically presented at the proper time, and can also ask questions which must be answered correctly by the student before he can proceed. The machine can also direct the student to write an answer to a short essay question, the correct answer to which is summarized by the machine when the student finishes writing and punches his answer sheet for a second question. Generally, the machine can be made to automate any aspect of the teaching function except spontaneous give-and-take between lecturer and class. Even in this area, the machine can be used to record such spontaneous give-and-take, and play it back to the individual student or class.

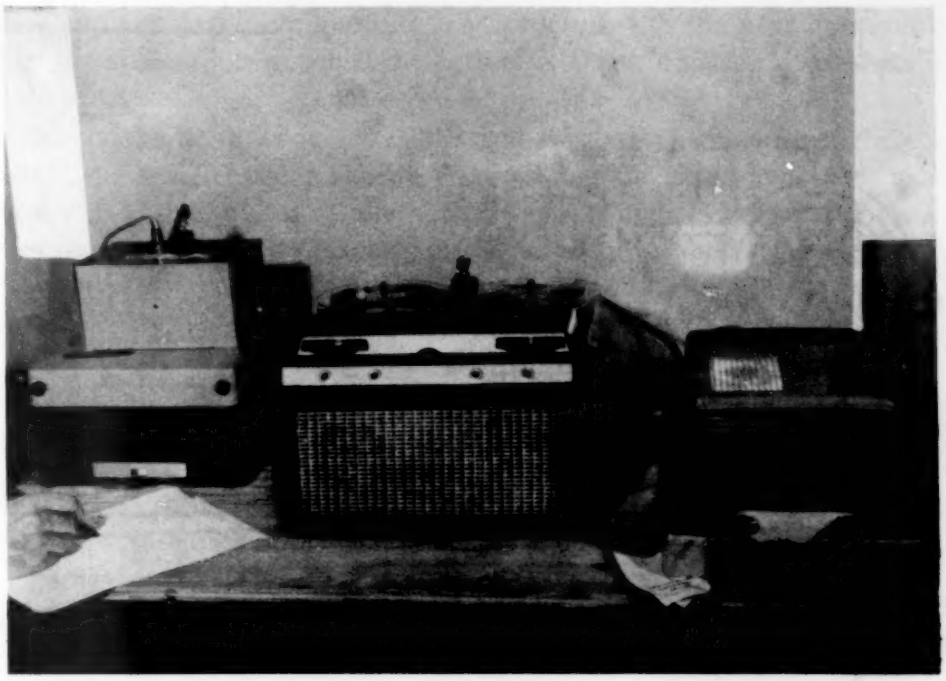

FIGURE I. *An audiovisumatic teaching machine. Composed of a magnetic tape recorder, an electrically controlled slide projector, and an audiovisumatic control unit, the machine automates the lecturing function and the presentation of visual slide material. It also automatically feeds back information to the student for incorrect and correct responses to questions put to him by the machine.*

Figure II diagrams the circuit relations of the components of the audiovisumatic teaching machine. Two of these are conventional components, a tape recorder and a standard 2 x 2 slide or filmstrip projector. The audiovisumatic control unit is a small amplifier-relay which is sensitive to very small signal voltages and will control fairly heavy load currents. This basic control relay has been perfected over a period of some years in our research on electronic methods of human motion analysis. As used in the audiovisumatic teaching machine, the relay can be activated by contacts placed on the magnetic tape to control the operations of the slide projector or the motor of the tape recorder. One circuit in the device is connected to the motor of the tape recorder, and to a special electrode stylus used by the student. Contacts on one side of the magnetic tape activate this signal circuit and stop the tape recorder. When the student marks an answer sheet correctly, the tape

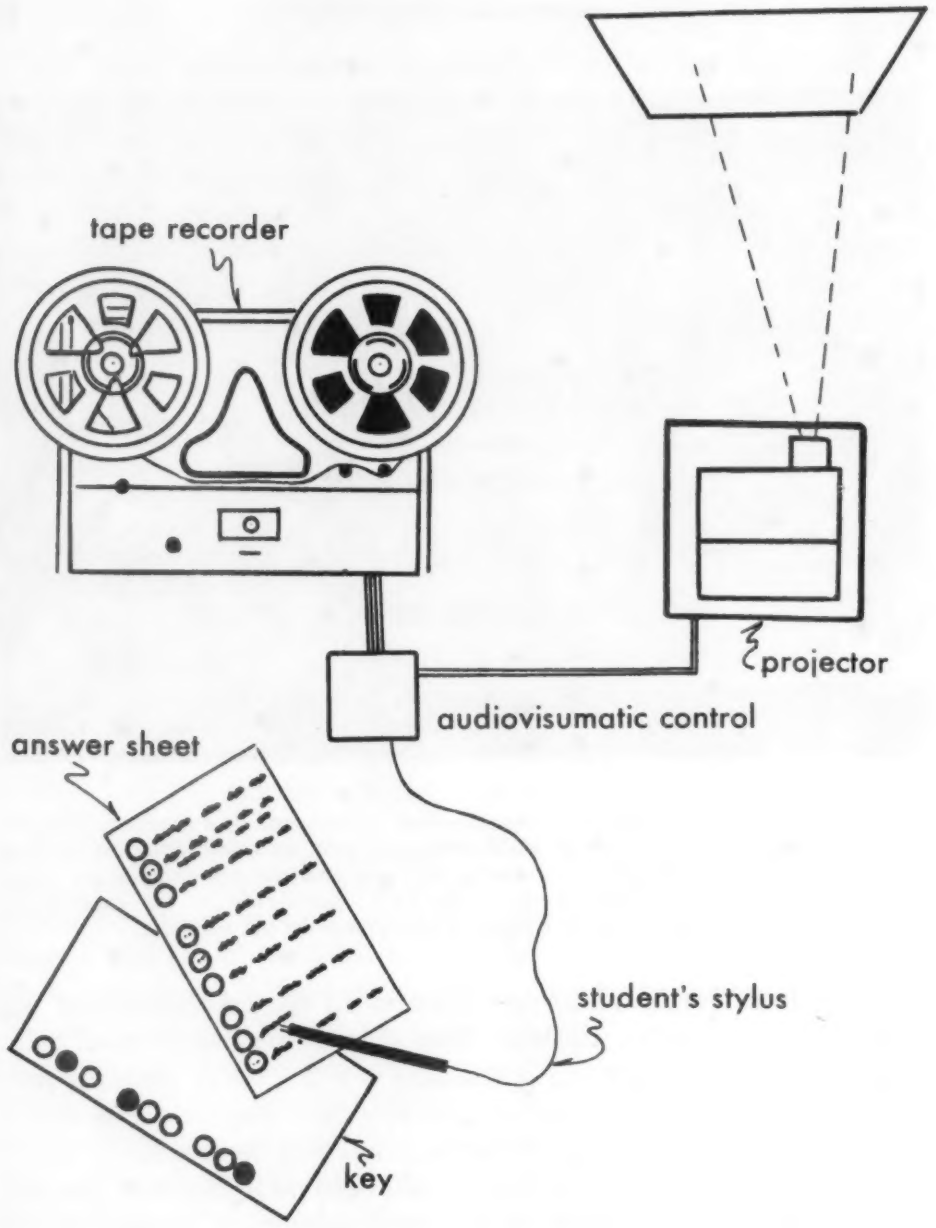

FIGURE II. *The circuit relations of the component parts (magnetic tape recorder, slide projector, audiovisumatic sensing and control unit, and answering sheet). The machine automates the oral lecture by conventional playback technique. The slide projector is activated by means of contacts on the magnetic tape which provide a signal to the audiovisumatic control unit. The feedback of information about correctness of answers is automated by using the contact between the student's stylus and marked areas of the answer key to switch the signal circuit of the control unit and to start the tape recorder.*

recorder starts up again. Thus the machine can be made to stop automatically after asking a question, and proceed with the next question after the student has punched the correct response on the answer sheet with his stylus.

One of the big advantages of the audiovisumatic teaching machine is that the teacher can make up his own answer sheets and keys, as shown in Figure II. The alternative multiple-choice answers to the questions asked by the machine are printed on a sheet of paper by either ditto or mimeograph process, and answer spaces are drawn beside these statements. To make a key, the teacher merely blackens the spaces on one sheet corresponding to the correct answers. This sheet is placed below the answer sheet. When the student punches the answer sheet correctly, contact of his stylus with the graphite of the marked key (below the answer sheet) completes the circuit of the audiovisumatic control and starts the tape recorder which then asks another question and stops automatically.

The same principles used in the audiovisumatic machines are employed in the construction of visumatic and audiomatic teaching machines. For the visumatic unit, lecture material and questions are put on film or slides. When a question is asked, the student must respond correctly in order to get another slide or question.

In addition to the types of controls already described, the audiovisumatic control unit can be connected to timers, counters, mechanical registers, or markers in order to obtain quantitative data on time, errors, and correct responses of students in relation to various methods and procedures of teaching. Thus audiovisumatic techniques can be used in educational research to evaluate variable elements of the teaching situation. Type of voice, rate of talking, difficulty of material, integration of visual-aural material, programming of special courses, pretesting of new courses—all of these can be tested quantitatively by audiovisumatic methods.

PRELIMINARY EVALUATION

The audiovisumatic and visumatic teaching machines have been given a preliminary evaluation in a series of lectures, lecture demonstrations, and laboratory studies of lecture review and automated tutoring. In a class of approximately 90 students in beginning psychology a highly technical audiovisumatic lecture on hearing was

presented. In a regular class session two weeks later, some of the material from this lecture was used to demonstrate the lecture review and automated tutoring functions of the audiovisumatic teaching machine. One month later, a two-part attitude survey was presented to the students in the course. A first part asked the students to list in order the three positive and the three negative features of audiovisumatic teaching they considered most significant. In the second part of the survey, the students' attitudes toward the machine were compared with their attitudes toward other teaching aids.

A second evaluation of audiovisumatic teaching was conducted in a class of 45 students (juniors and seniors) in industrial psychology. A 45-minute illustrated lecture on unemployment was prepared in which some 20 slides were used. Only four of these slides were actual drawings; the rest were handwritten outlines of subject matter of the lecture, which were correlated with the oral presentation by the machine. In the absence of the regular teacher, this audiovisumatic lecture was presented without comment by an assistant. Three weeks later, a demonstration of audiovisumatic teaching was given to the class in which the lecture review and automated tutoring functions of the machine were shown and possible uses in marketing, advertising, selling and industrial training described. Several weeks later, these students were presented with the two same general survey procedures used with the elementary students, except for some differences in the preference items in the second part of the survey.

Four exploratory laboratory studies have been run on audiovisumatic lecture review and automated tutoring. In the first, reaction time and number of correct responses to questions about lecture material following the initial presentation by a machine were compared with reaction time and correct answers after a single review. In a second study, two groups of subjects were compared in regard to two conditions of learning the material of a 20-minute industrial indoctrination lecture. One group heard the audiovisumatic presentation of this lecture and the other read the same material from a printed manual. In a third study visual presentation of artistically illustrated material in psychology was compared with an entirely verbal presentation, presented visually on slides by means of a visumatic machine. The level of information gained from the two methods of presentation was measured in terms of the number of correct responses to the questions. In

the fourth study a similar comparison was made between oral and visual presentation of paired nonsense syllables. Reaction time and number of correct responses were measured by means of the audiomatic and visumatic controls.

Critical Positive Attitudes

In the first part of the attitude survey students were told to list the three critical features of audiovisumatic teaching which for them best defined the advantages and the three which best defined the disadvantages. The number of times that a given critical factor was listed was determined.

Table 1 shows those positive factors listed at least five times by students in elementary psychology. Out of a total of 204 responses of positive factors, 21 fell into categories with frequencies below five, and are not shown. The positive factors listed by advanced students at least four times are shown in Table 2. Out of a total of 120 factors listed, 25 fell into categories with frequencies below four and are not shown. The wording of these factors follows the word usage of the students as closely as possible.

Tables 1 and 2 show that relating vision and hearing by the audiovisumatic teaching machine appears at the top of the list for beginning students and second in frequency for advanced students. Beginning

TABLE 1—CRITICAL POSITIVE FACTORS LISTED FOR AUDIOVISUMATIC TEACHING BY BEGINNING STUDENTS

Factors	*Frequency*	*Percent*
Lecture and material related	39	19
Can be replayed (lecture review)	23	11
A good learning device assuring understanding	15	8
A quiz giving your own knowledge at once	14	7
Better organized material	12	6
Sticks to or emphasizes subject	10	5
Good visualization or visual supplement	9	4
Optimum type of teaching device	8	4
Substitute for reading	8	4
Increases efficiency in time and work	8	4
Improves learning with voice and vision	8	4
Holds attention	7	3
Lectures at your leisure—a private lecturer	6	2
Combines sound and sight that a lecturer can not	6	2
Better lectures	5	2
Eliminates distracting mannerisms of the lecturer	5	2
Total number of responses—204		

TABLE 2—CRITICAL POSITIVE FACTORS LISTED FOR AUDIOVISUMATIC TEACHING BY ADVANCED STUDENTS

Factors	*Frequency*	*Percent*
Can be used to bring experts to class	33	27
Correlates vision and lecture	20	17
Used to perfect lectures	12	10
Lecture more complete or better organized	7	6
Reduces load on instructor	6	5
Attracts attention better	5	4
Increases variety in class	4	3
Can be used when lecturer is absent	4	3
Changes atmosphere of classroom	4	3
Total number of responses—120		

students emphasized the values of automated tutoring and the lecture-review functions, whereas advanced students strongly emphasized its value in bringing the recorded lectures of great men and of experts into the classroom.

Factors mentioned by the beginning students but not given in the table were: greater range of lecture material; interesting new method; an effective method for dry courses not offset by the lecturer's personality, or for factual courses. Factors mentioned by advanced students but not given in the table were that audiovisumatic teaching constricts the time and distance for the classroom, that lectures can be repeated, that the method can be used for parts of the lecture, and that it is easy to take notes.

Critical Negative Factors

The negative factors listed by elementary and advanced students for audiovisumatic teaching are given in Tables 3 and 4. Listed most frequently by elementary psychology students are the rigidity of machine teaching, its impersonal nature, the fact that the main lecture given was too fast (which it was), and that the machine cannot be reversed for quick review. Negative factors not shown in Table 4 were the machine's failure to inspire constructive thinking, the fact that it might get fouled up, its expense, and its difficulty of use.

The negative factors listed most frequently by advanced students are similar to those of the elementary students, namely, that the machine gives one no chance for his own questions, that it is too impersonal, that it doesn't hold attention as well as a live lecture, and that it might be misused. Other factors mentioned by these advanced students were that the machine must still be operated by someone, that

TABLE 3—CRITICAL NEGATIVE FACTORS LISTED FOR AUDIOVISUMATIC TEACHING BY ELEMENTARY PSYCHOLOGY STUDENTS

Factors	*Frequency*	*Percent*
Can't raise specific questions of your own	31	16
Too impersonal; doesn't have human effect	31	16
Lecture given was too fast *	24	12
Will not permit rapid return to earlier point	15	7
Could become boring; or, lacks interest	9	5
Lecturer too technical *	9	5
Not as convenient or as good as book	8	4
Hard to remember things by machine	7	4
Too mechanical (degrades student)	7	4
Monotony of voice and rate on machine	6	3
Can't go at your own rate	6	3
Note-taking difficult	5	3
Can't replace books	5	3
Not as good as live lecture	5	3
Total negative responses—194		

*This was a highly technical lecture on hearing that was intended to pressure students to the point of being frustrating.

TABLE 4—CRITICAL NEGATIVE FACTORS LISTED FOR AUDIOVISUMATIC TEACHING BY ADVANCED STUDENTS

Factors	*Frequency*	*Percent*
No chance for questions of your own	32	28
Too standardized and impersonal	24	21
Doesn't hold attention as well as lecturer	10	9
Might be misused	7	6
Too fast and "production-like"	4	3
Mechanical failure would spoil lecture	4	3
Possibility of boredom great	4	3
No repetition to clear up points	4	3
Novelty of machine may wear off	4	3
Total negative responses—115		

the sound was not clear, that the machine would lead to class cutting, that it would not be possible to use such teaching as a course. Neither group of students listed as many negative factors as positive ones.

Preferences of Students for Audiovisumatic Teaching Procedures

In the elementary psychology class a three-item attitude scale was used which permitted comparison between the use of audiovisumatic teaching, an artistically illustrated book (1), and an artistically illustrated workbook (2). The results on these items are given in Table 5 in terms of the frequency and percentage (given in parentheses) of

students who strongly agreed, agreed, or were in doubt about the alternative preferences in each item.

The book used by this class is a highly illustrated textbook which has been judged by over 85 percent of two large classes in elementary psychology to be well organized and interesting. Table 5 shows that 33 percent of these elementary students either agreed or strongly agreed that they preferred the use of an audiovisumatic machine to a book of this sort for study. The workbook used in the course is an artistically programmed workbook, generally liked by students, as judged both by attitude surveys and by comments. Fifty-seven percent of the students in this study either agreed strongly or agreed that they would prefer audiovisumatic teaching methods to the use of a workbook.

On the general item of preference for use of audiovisumatic teaching in a course, 78 percent of the students agreed or strongly agreed that they would like the machine sometimes in class.

TABLE 5 — PERCENTAGE OF STUDENTS (IN PARENTHESES) SHOWING DIFFERENT INTENSITIES OF ATTITUDE TOWARD EDUCATIONAL TECHNIQUES (N=78)

Item	*Strongly Agree*	*Agree*	*Doubt*
Prefer book	(48) 38	(13) 10	(3) 2
Prefer machine	(14) 11	(19) 15	(3) 2
Prefer machine	(17) 13	(40) 31	(0) 0
Prefer workbook	(18) 14	(22) 18	(3) 2
Would not care for machine at all	(15) 11	(5) 4	(0) 0
Would like machine sometimes	(39) 29	(39) 29	(3) 2

TABLE 6—ATTITUDES OF ADVANCED STUDENTS TOWARD AUDIOVISUMATIC TEACHING (N=42)

Item	*Strongly Agree*	*Agree*	*Doubt*
Would like machine sometimes in class	(48) 20	(43) 18	(9) 4
Would not be interested in having it in class	(0) 0	(0) 0	(0) 0
Would like complete audiovisumatic course	(2) 1	(29) 12	(38) 16
Would never take audiovisumatic course	(7) 3	(17) 7	(7) 3
Would like audiovisumatic center at University of Wisconsin	(50) 21	(38) 16	(12) 5
Would not like audiovisumatic center at University	(0) 0	(0) 0	(0) 0
May be made as good as live lectures	(2) 1	(21) 9	(29) 12
Can't be made as good as live lectures	(20) 8	(26) 11	(2) 1
May be made as good educationally as motion pictures	(20) 8	(46) 19	(14) 6
Can't be made as good educationally as motion pictures	(2) 1	(9) 4	(9) 4

The students in the industrial psychology class were given a five-item preference scale, as shown in Table 6. Ninety-one percent indicated that they would like the machine sometimes in class; none indicated that they would not. Thirty-one percent agreed or strongly agreed that they would like a complete audiovisumatic course; 24 percent said they would not take such a course. Eighty-eight percent noted they would like an audiovisumatic teaching center in the University; none noted they would not. Twenty-three percent thought that audiovisumatic teaching could be made as good as live lectures; 46 percent thought that it could not. Sixty-six percent agreed or strongly agreed that audiovisumatic teaching could be made as effective as motion pictures; 11 percent thought it could not.

Effect of Audiovisumatic Lecture Review

Measurements were made of the effects of audiovisumatic lecture review on both errors and reaction time to objective questions presented by the machine. In order to obtain highly conventional and easily understood material for these lectures, we used interesting, well-known advertisements about cameras, liquor, ladies' garments, travel, sports equipment, projectors, and so forth. Twenty of these samples were recorded on an audiomatic tape by the writer. Ten were one-minute in length, and ten were two-minute talks. The two types of talks were given alternatively, starting with the shorter. At the end of each talk, a single question was asked about some major fact presented in it, after which the machine stopped automatically until the correct answer was marked on a three-choice multiple-choice answer sheet. A precision time clock activated by the machine measured the reaction time to each question. An experimenter recorded the clock readings after each question was answered. Errors were determined by counting the number of incorrectly punched alternatives on the answer sheet.

Eighteen college students were used as subjects in the experiment, working individually with the audiovisumatic machine. They were rewarded for participation by extra examination points toward their final grade in the course. Each subject heard the lectures and answered the questions in an initial experimental period, and two days later the same procedure was repeated in a review period. Thus the results show the effect of a single review of the lecture as well as the effect of repetition of questions upon errors and reaction times.

The total number of error choices marked for each question on the two-minute talks is summarized in Figure III. None of these questions were answered correctly by all 18 subjects in the first session. In the second session, all but one of the subjects answered questions 6 and 12 correctly. The frequency of errors on some questions in the first learning was almost equal to the frequency of correct choices. Review sharply reduced the frequency of errors, usually by more than 50 percent.

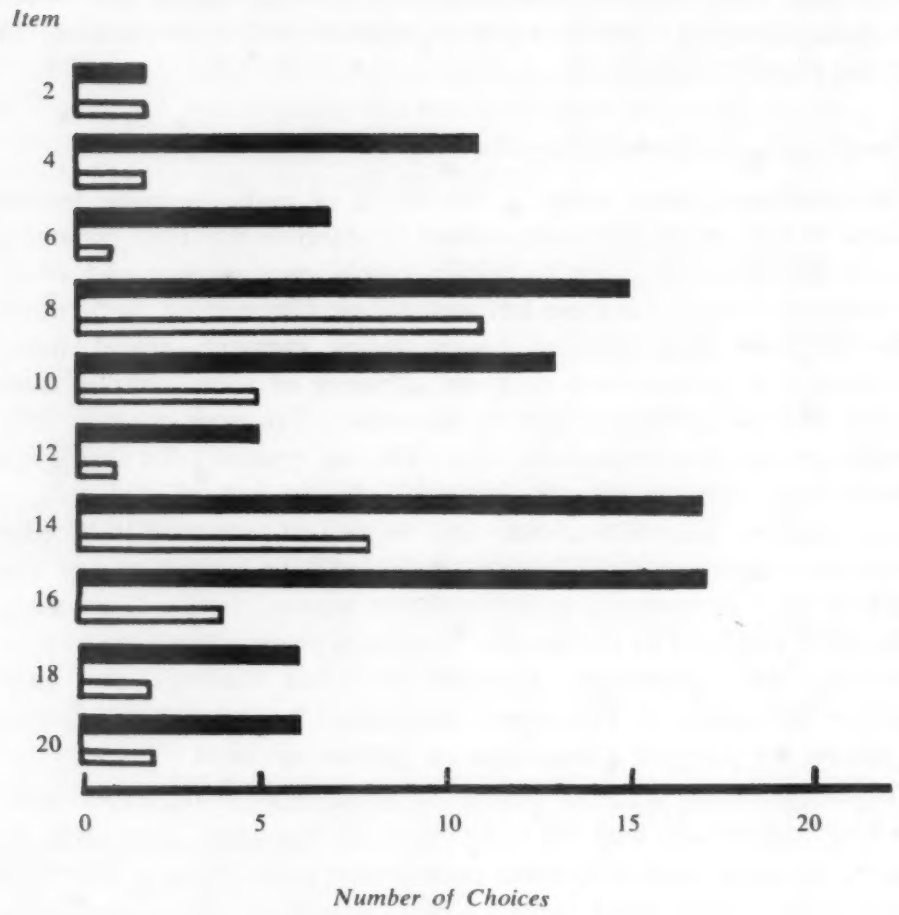

FIGURE III. *Frequency of choices marked by 18 subjects in an initial learning period and in a review period two days later. The minimum choice frequency possible for each question is 18—the number of correct responses among the 18 subjects. The frequency of choice above 18 represents error frequency.*

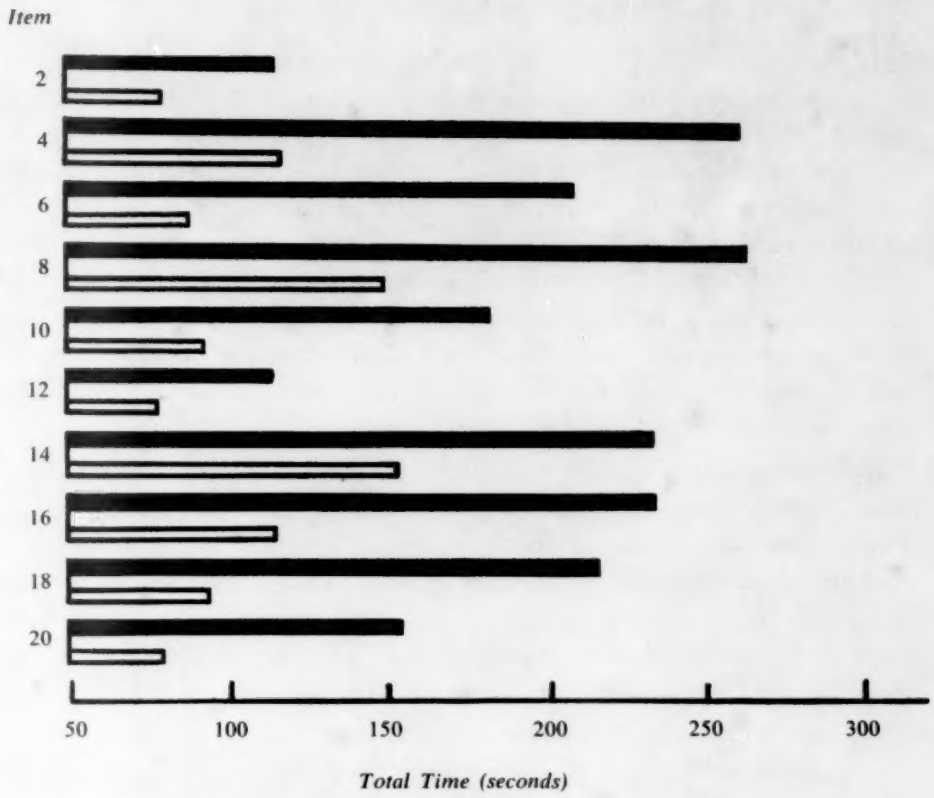

FIGURE IV. *Total reaction time of 18 subjects to each of 20 questions in the initial learning periods (black bars) and review periods (open bars). The data show that review has the effect of sharply reducing the response time of students in answering specific questions based on lectures.*

Results equivalent to these were found on error choices to questions based on the one-minute talks.

Similar results were found for response time to each question. Figure IV summarizes the total reaction time of the 18 subjects to each of the 10 questions based on the two-minute talks. Time of response on half the questions (Nos. 4, 6, 16, 18, 20) was reduced by 50 percent or more between the initial learning and review questions. The response-time data for questions about the one-minute talks in general duplicated these results found for the two-minute talks.

Tests of significance of the differences in the error scores and time scores between the initial learning and review sessions show that both of these differences are significant at the 1 percent level.

Comparisons of Different Methods Presentation [2]

In the first of three studies made in this area, audiovisumatic presentation of job indoctrination material was compared with presentation of the same material in printed manual form. The 24 student subjects, 12 who held residence-hall jobs and 12 who were applicants for such jobs, were divided into two experimental groups. One group was trained audiovisumatically and the other trained with printed material. Analysis of the data indicated that there was no significant difference between the mean errors made by each group in responding to questions covering the learning material. The main result of this research was to show that audiovisumatic trainers can be used as effectively for job indoctrination training as printed training material.

In two additional studies in this series, visual and aural techniques of presenting learning material were investigated. Among a group of 20 subjects, no differences in response time or in errors were found in learning associations between visually and aurally presented materials. The final study of this series showed that students to whom non-illustrated printed training material was presented visumatically answered questions equally well as those who were given a highly illustrated presentation of this same material.

The three studies just described have demonstrated that the audiovisumatic teaching machine is a flexible research instrument, useful in many kinds of educational research. The results of one study indicated that learning indoctrination material with the machine produced as accurate immediate memory as learning from a printed manual. In using the machine for comparing different types of visual and aural presentations, we have found no marked group differences in retention correlated with the various controlled methods of communication.

THEORY AND DISCUSSION

The development of audiovisumatic teaching devices described here has been guided by an overall theory of design of teaching procedures and methods, including textbooks and workbooks. In this so-called "perceptual-geometric theory" of symbol learning, the central notion is that learning in reading and listening is motivated and reinforced by

[4] Richard Pinsker, Philip Jurgens, John Carlson, and Patrick McCann assisted in these stages of the research.

systematically promoting active use of words in relation to the perception of objects and space.

The first main point of this space-organized theory of symbol learning is that learning in reading and listening is an active process, aided and regulated by nonverbal perceptual experience which provides a base of meaning for symbols and verbal abstractions. This perceptual organization in the classroom can be aided by the nonverbal behavior of the teacher, by demonstrations, by graphs, by laboratory exercises, by object displays, and especially by artistically designed illustrative material. It can also be aided in the classroom, in lecture review, and in individual study, by audiovisumatic teaching devices.

The second point of the theory is that visual art and illustration do not necessarily enhance immediate verbal memory, but that they motivate and broaden the active use of language and deepen insight by the student into the different dimensions of abstraction and thought. Well designed artistic illustration promotes understanding of the esthetic, moral, pragmatic, and emotional values in any learning situation, as well as the purely logical, scientific, or abstract concepts of language. Artistic illustration is an age-old, universal form of nonverbal communication that formed the bases of written language at its beginning, and which still is an essential accompaniment of the effective use of abstract symbols. We have applied this principle in designing the audiovisumatic teaching machine, which makes possible the economic use of artistic illustration in all phases of classroom teaching.

A third principle of our perceptual-geometric theory of symbolism, which has been followed in the present development of audiovisumatic teaching devices, is that effective classroom illustration involves the use of correlated artistic design and symbolism. We mean that different forms of artistic drawing—representative, abstract, and impressionistic —can be used to enhance the motivation and level of creative thought of the student. Representative illustrations clarify specific object relations. Abstract drawings, along with the line graphs, deepen understanding of interaction of events, especially human and social interactions which cannot be quantified. Impressionistic designs promote understanding of object relations in terms of individualized emotional and perceptual values. It is our belief that the audiovisumatic teaching machine may be a more effective device than the motion picture or television in bringing correlated art into the classroom.

Recognizing the significance of reinforcing informational feedback to the student, in classroom learning or individual study, the present theory emphasizes that this feedback should involve organized perceptual responses on the part of the learner. Specifically, the perceptual-geometric theory of symbol learning assumes that visual illustration serves to act both as a motivating and as a reinforcing agent in reading and listening at three levels: (1) in providing a perceptually organized environment that creates familiarity with what is read and heard; (2) in directly reinforcing unfamiliar words and phrases by giving nonverbal behavioral cues of meaning for what is heard and read; and (3) in promoting creative thought about interaction of events through use of varied correlated forms of artistic expression—representative, abstract and impressionistic—to enhance the meaning of verbal symbols.

The final point of the present theory is that most, if not all, the communicative phases of classroom teaching can be operationally specified in terms of (1) the functional levels of teaching (lecture, lecture review, and individual tutoring or instruction), (2) the communicative behavior of written and oral speech, and (3) the nonverbal forms of emotional and artistic expression. Functional levels of teaching do not differ in terms of the words taught but in terms of the nonverbal activities used in lecturing, lecture review and in individual instruction. The audiovisumatic teaching machine is designed to automate all three of these functional levels of teaching and all phases of verbal and nonverbal expression in each of them, except the nonverbal gesture and emotional expression of the teacher. Thus, the audiovisumatic machine is designed not only to carry out the activities of teaching in an effective way, but to permit control of teaching functions and communications for research purposes.

The theory outlined above was confirmed by some of the results of the present research. In our survey of self-formulated opinions about audiovisumatic teaching methods among elementary and advanced psychology students, the relating of vision and hearing was placed near the top of the list of positive characteristics of the teaching machines. This preference conforms to our general emphasis on the importance of organized perceptual responses in the learning situation. Further, the students' negative opinions concerning the lack of individual participation in audiovisumatic teaching and its impersonal character also conform to our general theoretical formulations. The audiovisumatic

machine was acceptable to the students in so far as it promoted active, organized perceptual responses, and unacceptable in so far as the students felt limited in their participation.

The overall effectiveness of audiovisumatic teaching can be judged in terms of how well it conforms to desirable educational procedures as well as certain other practical considerations. In general we feel that the audiovisumatic machine is a flexible device which can be used at its best to provide highly varied, stimulating, and provocative classroom situations. Some of the different uses to which this machine can be adapted are the following: the use of recorded lectures and selected visual materials by experts in special fields and other well-known persons (the advanced students listed this as a highly desirable characteristic); interplay between the teacher and recordings of his own lectures; teacher-machine discussions; illustrated lecture review; various types of student-controlled programmed tutoring; use of recordings of related sounds and sights in nature; and playback of visually illustrated sounds of music and human communication.

An important consideration in assessing the significance of audiovisumatic devices is how they compare with motion pictures and television in classroom use. From the teacher's point of view, the audiovisumatic machine does a better job of teaching because it duplicates so well the normal teaching functions and has a flexibility in use not achieved by motion pictures or television. The audiovisumatic trainer promises to be a very economical device, both to build and to use. Made up of conventional components, a magnetic tape recorder and slide projector, plus an electronic control unit, it probably can be reduced in size from the present developmental units, and produced in quantity for about $300. The materials needed to prepare lectures, magnetic tapes, slides, and filmstrips are cheap and easily available. Teachers need no technical training either to prepare their own illustrated lectures, to run the machines, or to prepare programmed material for individual tutoring.

The audiovisumatic teaching machine is distinctive in providing for the use of standard answer sheets for controlled reinforcement in programmed tutoring. Answer-controlled reinforcement for both aural and visual questions is possible, as well as for aural questions directed toward visual displays. The great advantage here is that the teacher can make up his own answer sheets, quickly and easily, just as he can

prepare his own coordinated aural-visual lectures, reviews, and questions. This personal control by the individual teacher of his automated teaching materials cannot be duplicated by motion picture and television techniques.

Audiovisumatic methods are applicable to many areas of teaching besides those investigated to date. Others include: (1) the development of integrated audiovisumatic lecture services for liberal studies; (2) the development of scientific and mathematical teaching services for the general public; (3) audiovisumatic aids to training in engineering, medicine, and other specialized fields; (4) use of audiovisumatic procedures for television presentation and control; (5) development of more effective teaching devices for the blind and the deaf; (6) use of audiovisumatic techniques in industrial training, advertising, marketing, and selling procedures; (7) development of community teaching centers utilizing audiovisumatic materials; (8) improvement and broadening of correspondence teaching; (9) providing audiovisumatic teaching services for underdeveloped nations; (10) setting up audiovisumatic teaching exchanges in order to broaden the use of knowledge of foreign scholars; and (11) expanding teaching services for hospital and military isolates.

In addition to its use as a teaching machine, the audiovisumatic device provides an interesting technique for future educational research. Various communication processes of teaching, verbal and nonverbal, aural and visual, can be automated and are subject to flexible control.

SUMMARY AND CONCLUSIONS

1. This paper describes the theory, development, application, and evaluation of a new procedure in education which we have termed audiovisumatic teaching.

2. Audiovisumatic teaching machines automate all levels (lecturing; lecture review; and answer-controlled, programmed tutoring) and all major visual and aural patterns of communication in teaching.

3. The audiovisumatic devices originally developed in this research are made up of a magnetic tape recorder, a slide projector, and an electronic control unit, which can be operated by the teacher or student.

4. A distinctive feature of these machines is that they make use of standard answer sheets in machine-control or reinforcement feedback

to the student in programmed tutoring and can be used by the average teacher without technical assistance.

5. A series of studies indicated that students not only have strong motivation to use audiovisumatic methods of teaching at the university level, but that they prefer these methods to some other methods of instruction. Two studies on self-formulated student attitudes confirm our views that the values of audiovisumatic methods depend on their effectiveness in (a) relating visual art and verbal material, (b) providing immediate informational feedback to the student in lecture review and programmed tutoring, and (c) increasing variety of perceptual communication and review of classroom material.

6. The results of one laboratory study indicated that audiovisumatic lecture review greatly increases accuracy and speed of responses to lecture questions.

7. Three studies indicated that audiovisumatic techniques promote a high degree of control of avenues of communication in instructional research and that such methods are as good as using printed material in job indoctrination training.

8. Several future applications of audiovisumatic methods in university teaching, industrial training, advertising, correspondence teaching, and training of human isolates are indicated.

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Effectiveness of Inserted Questions in Instructional Films

BERNARD R. KANTOR *

SEVERAL HUNDRED experimental studies have been made in the past 40 years on the influences and effectiveness of instructional motion pictures. Today, the teacher is faced with the problem of teaching an ever-increasing amount of knowledge in a short time. With this dilemma facing the classroom teacher (1), research data dealing with the motion picture have an increased practical and theoretical importance.

Various studies have indicated an increased efficiency for the instructional film when it is properly used by the classroom teacher. Stopping the film at the end of sequences and discussing the content is considered good teaching technique in using films. Noting important points in the film and listing questions to be answered by the film are others (5).

All of these techniques work to maximum advantage, however, when the teacher has previewed the film in question. This procedure is rarely possible with the present-day demands on the teacher and the requirements of film distribution. There have been some suggestions from time to time that questions properly inserted within the body of the film might lead to greater teaching efficiency. Such questions might be motivational or aid in better mental "set." This study is an attempt to seek clarification in this area. If this and further logical steps prove fruitful, the teacher might be relieved of the responsibility of always previewing a film before showing it to a class.

Hypothesis

This study attempted to verify experimentally the hypothesis that inserted questions can significantly raise the teaching effectiveness of a factual instructional film when such questions are inserted both visually and aurally. Answers to the following specific questions were sought:

1. Is there a gain in teaching effectiveness of an instructional film where ques-

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tions are inserted into the film, visually and aurally, at natural divisions of the content?

2. Where should the questions be placed in such a film? (a) What is the effect on learning when the question is placed before the material about which it is concerned? (b) When it is placed after the material?

3. Will questions inserted into this film aid in greater retention of the material as measured by delayed recall tests than could be obtained without such questions?

4. Are there any differences in teaching effectiveness of a film with questions inserted as compared to no questions, when results are grouped by IQ, sex, age, and socio-economic status?

Design of Study

The first task was the selection of a suitable film from which to make the experimental versions. A factual film which was highly regarded and considered a "good" film by virtue of wide acceptance and use was *The Sunfish,* which was made available for the experiment by the Encyclopaedia Britannica Films, Inc. The population for the study was 617 second semester seventh grade pupils in three junior high schools in widely differing socio-economic areas of Los Angeles. Data available on each were (1) scores on the California Test of Mental Maturity taken within six months of the start of the study, and (2) occupation of the pupils' parents.

Three versions of the film, *The Sunfish,* were prepared. These included a control version and two experimental versions. In one experimental version the questions were inserted before the content concerned; in the other, identical questions were inserted after the content; the control version had no questions.

The eight questions used in this ten-minute film were photographed in such a manner that the quality was in keeping with the main body of the film. The narration was rerecorded along with the questions so that the same voice would cover both. The control version of the film was rerecorded with this same narration but without questions. Thus the attention-getting device of a sudden change in voice was eliminated.

On the basis of a pilot study, two test instruments were created, each having approximately the same reliability and measuring essentially similar content. Questions on these instruments were arranged in increasing order of difficulty and discrimination. One of these instruments became the pre-test, one the post-test. A combination of the two served as the retention test.

In each of the three schools, assignment of the films were made to permit equal numbers of classes, IQ groupings, sexes, and so on, to see each version. In each school, each film version was viewed by approximately 70 pupils (two classes of 35 each).

All of the pupils took the pre-test; one week later they saw one version of the film in their own classroom and took a post-test; five weeks after the post-test a retention test was administered. Preparation of each class was accomplished by reading a script containing all necessary instructions in order to insure the same preparation for each group. Data collected and recorded were age, sex, language index, socio-economic status based on a modified W. L. Warner occupation scale (4, 3),

test scores, film version seen, and school attended. Data were analyzed by analysis of variance and covariance.

Findings

Analysis of the population data indicated that the desired spread of population was more than adequate. There were sufficient numbers of pupils of high, low, and average intelligence and socio-economic status for the requirements of this study. There was a relatively equal number of boys and girls. Assignment of the film versions allowed for sufficiently matched groups to make competent analysis of the test results. The analysis follows:

1. On the pre-test, boys did significantly better than girls, which may be ascribed to a greater initial interest in the subject matter. Other than on this pre-test, there were no reliable differences between boys and girls for any of the film versions. (See Table 1.)

2. Pupils with high language index did significantly better on each of the film versions than those with low language index.

3. In each film version, pupils in high socio-economic status did significantly better than pupils in average socio-economic status, who, in turn, did significantly better than those in low socio-economic status.

4. As might be expected, there was virtually a "classical" arrangement in age, language index, and socio-economic status. Pupils in low socio-economic status had the lowest language indexes, were the oldest in grade, and were lowest in test results for all film versions. Pupils in high socio-economic status had the highest language indexes, were the youngest in age, and had the best scores on pre-test, post-test, and retention test for all versions of the film. Average-status pupils were average in language index, in age, and in test results for all film versions. All differences in such cases were very significant. As might be expected, although there were individual exceptions to the

TABLE 1—MEANS AND STANDARD DEVIATIONS OF TEST RESULTS FOR PRE-TEST, POST-TEST, AND RETENTION TEST, FOR TOTAL GROUP TAKING EACH TEST

Variable	*Group*	*N*	*Mean*	*Standard Deviation*
Pre-test	Boys	278	15.36	3.72
	Girls	305	14.36	3.47
	Total	583	14.84	3.62
	(t=3.36)		(p< .01)	
Post-test	Boys	276	25.90	4.15
	Girls	300	25.29	3.57
	Total	576	25.58	3.87
	(t=1.89)		(p< .10)	
Retention test	Boys	254	45.46	7.59
	Girls	273	45.01	7.13
	Total	527	45.22	7.35
	(t= .70)		(p< .50)	

NOTE: The pre-test and post-test contained 33 items each. The retention test contained 66 items.

TABLE 2—MEANS AND STANDARD DEVIATIONS FOR THE THREE FILM VERSIONS FOR FIVE VARIABLES FOR THE TOTAL POPULATION

Variable	*Group (Film Version)*	*N*	*Mean*	*Standard Deviation*
Language Index	Control	201	111.70	17.46
	Before Content	179	112.11	19.26
	After Content	196	112.43	15.63
	Total	576	112.08	17.43
	(F= .09)		(p=NS)[a]	(2.573 df)[b]
Age in Months	Control	201	150.82	6.73
	Before Content	179	150.60	6.47
	After Content	196	150.22	5.74
	Total	576	150.55	6.32
	(F= .45)		(p=NS)	(2.573 df)
Pre-test	Control	190	14.66	3.65
	Before Content	170	14.89	3.95
	After Content	182	15.20	3.21
	Total	542	14.92	3.60
	(F=1.05)		(p=NS)	(2.539 df)
Post-test	Control	201	25.67	4.19
	Before Content	179	25.49	3.99
	After Content	196	25.58	3.40
	Total	576	25.59	3.87
	(F= .10)		(p=NS)	(2.573 df)
Retention test	Control	188	45.45	7.13
	Before Content	165	44.52	7.92
	After Content	174	45.65	7.02
	Total	527	45.22	7.35
	(F=1.13)		(p=NS)	(2.524 df)

NOTE: The pre-test and post-test contained 33 items each. The retention test contained 66 items.

[a] NS=Not Significant. [b](2.573 df)=2 and 573 degrees of freedom, etc.

foregoing, the results were true for the total groups.

5. In view of the above alignment, the differences between the three schools naturally followed the same pattern: (a) The school in the generally high socio-economic area had the youngest pupils, with highest language indexes, and the highest test scores on all film versions. (b) The school in the low socio-economic area was low in all instances and had pupils of the oldest age group. (c) The average school, in the average socio-economic area, was average in all instances.

6. The total test results, as noted in Table 1, showed that the films did teach. The gains, as measured by post-test over pre-test scores, were highly significant in all cases, without a single exception. The same relative gain held for the retention test five weeks later, with a slight absolute loss, probably through forgetting.

7. Analysis of the test results as shown in Table 2 produced no significant differences in pre-test, post-test, or retention test by film version. All versions taught equally well for the total group.

8. Even when the data were analyzed for the complete cases only (498 pupils

who had taken all three tests, had seen one film version, and for whom complete cumulative record data were available), *there were still no significant differences in film versions. All film versions taught equally well.*

9. When film version data were analyzed by sex, school, socio-economic status, language indexes, or age, a scattering of differences were noted favoring one film version or another. However analyzing these sporadic differences by covariance, and incorporating initial differences in language index usually reduced any differences to a *not significant* state.

Conclusions

The original and basic hypothesis for this study — that inserting questions, both visually and aurally, would aid in greater learning from a film than would be possible from a film without such questions—is rejected. Pupils tested in this study, regardless of age, sex, socio-economic status, or language index, learned equally well from all three film versions. Further, the amount of learning retained, as measured by a retention test, was the same for each of the three film versions.

Each of the original questions relating to the main hypothesis can be answered in the negative. It seems to make no significant difference if questions are inserted before or after the content, or if no questions are used at all. In this case, the results differ from the suggestions by several other researchers (2). Their suggestion that insertion of questions should prove effective and therefore might well be adopted by film producers can be questioned, although there is another factor that enters in.

In a study such as this, consideration must be given to the size and nature of the sample when drawing conclusions. This study considered only seventh graders and hence it does not necessarily follow that inserted questions might not be effective with younger or older children. Repetition under different and better control, with different grade levels, might result in different findings.

Inserted questions in a foreign language film, where the question is in the language being studied and the answer is presented in printed or visual form or both, might be an interesting and worthwhile area for investigation. The attention-getting device of the question being spoken by a different voice from that of the film narrator is another possible area of study. Obviously, much more study is needed in the instructional film area, in the entire area of learning and, particularly, the dimensions of viewing.

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Can Subliminal Stimuli Teach?

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IS THERE a more economical way to communicate facts, ideas or concepts than some of the more conventional methods now in use? Is there some method for making present communicative media more effective? Certainly an affirmative answer to the above questions should be of great interest to educators, particularly if the means for achieving these goals is both practical and inexpensive. Subliminal stimuli administered while the subjects are viewing a motion picture, television broadcast, or filmstrip may provide the desired affirmative.

By way of definition, *subliminal* means that which is below the perceptible threshold. The *threshold* is the level at which things become perceivable (understood through the senses). The working threshold varies from person to person and, within the individual, from minute to minute. Subliminal stimuli may take the form of:

1. Sounds, either above or below the normal auditory range of 16 to 16,000 cycles.

2. Sounds heard but not associated with the main focus of attention, such as noises which stimulate or touch off subconscious overtones, or sounds which trigger psychological moods or feelings.

3. Visual imagery which is seen peripherally (not the main focus of attention) and which acts as a trigger for past responses.

4. Visual symbols projected constantly at an impoverished light intensity below the normal visual threshold.

5. Visual stimulation through high-speed projection at a rate faster than the eye can outwardly comprehend.

The hypothesis tested in this study is that subliminal stimuli administered while a film is being projected will produce significant differences in the responses of students taking the test as opposed to responses of students not subliminally stimulated. Populations

* Dr. Oxhandler, until recently assistant professor of audiovisual education at Pennsylvania State University, has been appointed associate director for research in the Audio-Visual Center at Syracuse University.

were drawn from undergraduate students taking courses in audiovisual education at Pennsylvania State University and at Fresno State College, California.

Prior to this experiment a review of pertinent literature and research was conducted. Examples of the more significant studies in visual stimulation are mentioned here:

1. In 1934, Publicity Films, Ltd., London (1), conducted an experiment in which the letters "OXO" were flashed and superimposed over a portion of blank film projected on a screen. The one-minute film was projected 20 times at one minute intervals to an audience of eight people, who were requested to record any impressions received from the experience. At the end of the performance, two people wrote down the letters OXO and one other person wrote OOOH. The experiment was repeated several times producing similar results each time.

2. Several seasons ago two groups, working independently with greatly divergent methods, claimed that they could increase the sales of products and influence the attitudes of subjects through mass subliminal stimuli. James Vicary (2), of Subliminal Projection, Inc., conducted a series of tests in motion picture theaters in which he demonstrated an appreciable jump in the sales of a soft drink and of popcorn. Mr. Vicary was said to have flashed his subliminal messages during the feature film at a speed in excess of 1/2000th of a second. Becker and Corrigan (3), working out of New Orleans, developed a similar method of projection which they have used over both motion pictures and television with similar claims of success.

3. Dr. George Guthrie, who is professor of psychology at Pennsylvania State University, and several of his colleagues have conducted studies in which individual subjects were electric-shock conditioned to produce a physical skin reaction (as measured by a galvanometer) to several out of a large sampling of nonsense syllables. Upon completion of the conditioning, subjects were exposed to the same nonsense syllables, this time projected under impoverished light conditions. The GSR (Galvanic Skin Response), however, remained the same even though the subject could not outwardly see the visual stimulus.

In an attempt to apply these findings to the solution of some of the questions posed in the opening paragraph, a small pilot experiment was designed by Thurston M. Reeves, Ben C. Duke, and Eugene Oxhandler at Pennsylvania State University. An excerpt from the motion picture *The Informer* was used. Mr. Duke devised two sets of test questions, the first set open ended; the second, multiple choice. The two key questions dealt with information that was not in the film itself, namely: "In what city did the action take place?" and "What was the date of the action?"

It was decided that the place, arbitrarily designated as CORK, would be subliminally induced by impoverished direct, continuous, illumination. A 2x2 piece of darkened plastic was used and the letters CORK were scratched into the surface. The slide was placed in a 150-watt projector which, in turn, was connected to a voltage transformer, allowing the illumination to be impoverished below the level of projected visibility. The date, NOV. 4, was similarly

incised on a 3¼x4 slide and placed in the appropriate projector. The bulb and reflector were removed from the housing of the projector and a small electronic flash outfit was substituted. The electronic flash produced an image on the screen every five seconds for the 14-minute duration of the film. The flash itself lasted approximately 1/750th of a second.

At the close of the first showing of the film, the open-ended test was administered to the 16 viewers. No viewers were able to identify the place as CORK; however, three people indicated the date as NOVEMBER and one person had the date as NOV. 4. The film was then reshown, this time with only CORK on the screen. At the conclusion of the second showing the multiple choice test was given with no conclusive evidence in favor of CORK. The three responses of NOVEMBER were repeated in the results of the multiple choice examination. Some of the subjects indicated that they thought they could see the message even though the investigators were unable to do so.

As a result of this pilot investigation the following experiment was undertaken. The film *Lessons From The Air*, produced by the British Information Service, was selected because it was used regularly as part of the audiovisual education courses given both at Penn State and at Fresno State College and because it has a sequence in which teachers hand in evaluation cards on radio programs they have reviewed. On one of these cards the date 20/4/43 appears, which might indicate a date slightly prior to the actual film production time.

During the winter of 1958 a test, shown as Figure I, was devised and given to approximately 250 students regularly registered in audiovisual education courses at Pennsylvania State University and to some 250 students at Fresno State College, all after they had viewed the film. The students were told that their instructors wished to check the effectiveness of the film in communicating both facts and ideas. One hundred tests from each group were randomly selected and scored. Table 1 records the results of these tests. It is readily apparent that both questions 11 and 16 ("*Lessons From The Air* was made at a date shown in the film. What

TABLE 1.

No.	*Penn State (100)*	*Fresno (100)*	*Total (200)*	*No.*	*Penn State (100)*	*Fresno (100)*	*Total (200)*
1	76	59	135	11	0	0	0
2	33	11	44	12	30	16	46
3	89	80	169	13	43	31	74
4	69	26	95	14	34	27	61
5	92	82	174	15	90	86	176
6	67	45	112	16	0	0	0
7	56	5	61	17	95	74	169
8	91	79	170	18	71	40	111
9	76	54	130	19	65	23	88
10	81	6	87	20	29	36	65

QUIZ: LESSONS FROM THE AIR

ANSWER QUESTIONS ON THIS SHEET IN THE SPACES PROVIDED.

1. What type of school does the educational wing of the BBC cover? *All types—elementary and secondary; rural and urban.*
2. The Chinese narrator's name was *Chou Chen.*
3. What was used to create the sound of boats in water? *Brick in pan of water.*
4. Who controls educational broadcasting in Britain? *A committee of educators and radio directors.*
5. Are teachers represented in #4? *Yes*
6. The Chinese broadcast began at *10 A.M.*
7. The *Celeste* was substituted for the piano in the Chinese program.
8. *Coconut shells* were used to create the sound of horses' hooves in the rhythms broadcast.
9. Stories from history were done in *dramatic* form.
10. What universities or colleges were mentioned? *Oxford, Corpus Christi.*
11. "Lessons From The Air" was made at a date shown in the film. What was the date? *April 20, 1943.*
12. The film lists one major use of educational radio in Great Britain. Name the use. *To bring reality to the classroom.*
13. How far ahead are the programs planned? *6 months.*
14. Who were the three planners of the China program? *Geographer, Chinese expert, radio director.*
15. Did the Chinese expert agree with the first script? *No.*
16. *Ann Driver* teaches rhythm activities to children over the BBC.
17. How do parents use the BBC with their children? *They listen to the same programs and discuss them with the children.*
18. The children are asked to *imagine* by the narrator of the historical drama.
19. How does the radio bring maps to life. *By creating images of far-off places.*
20. Who does the criticism of BBC educational broadcasts? *Selected committees of teachers.*

NOTE: The correct answers appear in italics.

FIGURE I

was the date?" and "_____teaches rhythm activities to children over the BBC.") failed to get correct answers from anyone. In the case of question 16, however, ambiguous phrasing precluded an accurate answer. A broader interpretation in scoring to include such answers as "a music teacher," "rhythms teacher," etc., would have produced a normal response. In item number 11 no one came even close to the correct answer.

During the 1959 summer session at Pennsylvania State University three groups of students designated here as groups X, Y, and Z were shown the same film and given the same test. As the film was projected a second machine, a 3¼x4 slide projector with the lamp and reflector removed and a Heiland II Strobonar flash lamp substituted in the housing, was used to flash the missing date on the screen at ten-second intervals. A 3¼x4 black-coated lantern slide with the date APRIL 20, 1949 scratched into its surface and filtered down with a piece of greyed photographic film, was used to produce the subliminal message. The date was deliberately changed to eliminate the chance of someone seeing the actual date on the film and answering the question correctly. The Heiland II Strobonar produced a high intensity flash at 1/2000th of a second. The message was focused on the screen with unfiltered illumination in a completely darkened room. The filter was inserted when the slide was used during the experiment. After the showing it was discovered that the focus of the slide had inadvertently been disturbed prior to the film showing to group X, quite probably prejudicing the results for that group.

Table 2 indicates the test results for groups X, Y, Z, as well as a T test of Proportion between the subliminally-stimulated and non-stimulated groups. In group X, with 28 subjects, we find two partially correct scores producing a non-significant T of 1.23. Group Y, with 16 subjects, had one completely correct answer and six partial answers for a T of 3.44, significant at the 1 percent level. Group Z, with 26 subjects, had seven partial answers for a T of 2.66, also significant at the 1 percent level.

On all the other questions, groups X, Y, and Z showed T scores of no significance indicating that all groups answered the questions equally well. The results definitely show that the subliminal stimulus made a distinct impression.

TABLE 2.

Group	*April*	*April 20*	*April 1949*	*1949*	*April 20, 1949*	*"T"*
"X" (28)	1			1		1.23
"Y" (16)	1	5			1	3.44
"Z" (26)		3	3	1		2.66

Most certainly the conditions for this experiment leave much to be desired, particularly from a scientific standpoint. Below are several factors which might tend to make the results questionable:

- Students reported seeing something on the screen during the film showing. One student indicated that he could see part of the message.

- The extra projector and operator, no matter how well disguised, were elements of distraction.

- No attempt was made to predict accurately a common threshold in terms of illumination, frequency of stimulus, speed of exposure.

- No attempt was made to assess the subject's physiological and psychological backgrounds. (Several students reported dreaming about the date, others stated that for a few days after exposure to the subliminal message, the date would come to them whenever they closed their eyes.)

- Randomization was haphazard rather than deliberate. Randomization might well be necessary for more accurate results.

- Other variations of subliminal stimuli were not utilized. No attempt was made to (a) cue the viewer to look for a particular fact, idea or concept within the film itself, and (b) reinforce existing facts, ideas or concepts to increase learning where an item on a test has shown weak or inconclusive responses.

To facilitate a more accurate study of the phenomenon of subliminal perception and its relation to the teaching-learning process, some of the following items will need to be provided:

1. A device (now in the preliminary design stage—no funds available for its construction) to allow experimenters to control the major variables of (a) intensity of illumination from 0 watts to at least 2000 watts, (b) duration of the flash from 1/10th of a second to 1/10,000th of a second, and (c) frequency of the flash from one every minute to at least 24 per second. (A source of illumination for such a controlled device seems, at present, to be the main drawback to its construction.)

2. Adequate records and interview tapes on all subjects tested.

3. Definite follow-up procedures to check duration of learning and other subconscious effects and to discover whether the message delivered appears in some people at a later date and in another context.

4. Room conditions permitting projection entirely without student awareness.

Exploration of the potentials of subliminal stimulation might well be attempted in all of the areas suggested in the opening paragraph (sounds as well as visual imagery) to truly determine the possibilities of this technique. Certainly the findings of this simple study indicate that there are affirmative answers to these questions.

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A Brief Study of Televised Laboratory Instruction

WARREN F. SEIBERT AND
JURGEN M. HONIG

This article is a condensed and modified version of a February 1959 mimeographed report by the authors. The mimeographed original includes copies of measuring devices used in gathering data for the study which can be had by writing the senior author at the Audio-Visual Center at Purdue University. Dr. Seibert, who was recently on leave to the U. S. Office of Education as research coordinator for the Educational Media (Title VII) Program, returns to Purdue July 1 as TV Program Research Consultant. Dr. Honig is currently with the Lincoln Laboratories, Massachusetts Institute of Technology. The writers thank Frederick Vratney, Post-Doctoral Fellow in Chemistry; D. F. Kasten, graduate student in Psychology; the staff of the Purdue TV Production Unit; and the several graduate students who served as performance evaluators. All made contributions to the study on which this report is based. It goes without saying that the student subjects were essential and their cooperation appreciated.

INTEREST in possible educational uses of television has increased at a fairly rapid rate during the past half dozen years and evidence of this interest can easily be found in the many popular articles on the subject, and in the increasing number of research reports that deal with the results of these instructional trials. Controversies concerning the place of television in formal education have been by no means absent; nevertheless, the writers are naive enough to hope that these disputes can be diminished in intensity or frequency through increased reference to the findings from careful research and through reliance on the most substantial accumulated experience. Perhaps the following report

will make a contribution in the desired direction.

Reports such as those from the Pennsylvania State University (2, 3), the State University of Iowa (1, 11), Miami University (8, 9), and Purdue University (4, 10) provide a basis for remarks such as Kumata's that "On the whole, television students have done as well as other students . . ." (6, p. 5). Although a considerable number of carefully planned, well executed studies lend support to the Kumata statement and although there is no intention of discounting the significance of the "no significant difference" statements contained in earlier reports, it is true that the great majority of these studies have utilized as criteria the students' factual knowledge, ability to apply the principles learned, or "information gain." Relatively little attention has been given to the difficulties or effectiveness of televised instruction in laboratory skills.

In 1956 and again in 1957 The Fund for the Advancement of Education made grants to the Purdue University Department of Chemistry to permit study of televised and other audiovisual instruction in the general chemistry laboratory. Valuable experience was gained in the course of these instructional trials and, for the most part, indications were that televised instruction in the general chemistry laboratory at the college level can offer several useful solutions to instructional problems which exist or can be anticipated.[1] During the two years of preliminary trial, some information concerning student laboratory achievement was gathered and examined. This information has been helpful and interesting but its quality has been limited by the necessities and pressures which arise when several hundred students are enrolled in a single course.

Purpose of the Study

This study was planned and conducted so that information might be derived to supplement experiences and information from the earlier and more extended trials of televised laboratory instruction at Purdue University. In comparison with earlier trials, it was judged that this study would lose extensiveness but would compensate for the loss through a significant increase in the precision of variable control. Attention has been given to maintaining instructional conditions typical of those present in earlier trials and typical of those which might be used in the future. As in most previous studies of televised instruction, the principal question to be answered was: Can televised (laboratory) instruction serve as an effective substitute for instruction as normally given?

Procedures of the Study

The study plan included provision for data from 60 subjects (S s)—12 S s in each of five groups—but experience has shown that, in spite of all precautions, some attrition of the sample is inevitable. Therefore, 70 S s were signed to participate and a plan was developed to eliminate excess data, if any, randomly. The volunteer S s were obtained through the Department of

[1] The most recent and inclusive of the reports concerning televised and other audiovisual instruction in the general chemistry laboratory is entitled *The Utilization of Audio-Visual Aids in the General Chemistry Laboratory Work at Purdue University*, August 1958. Copies of this and the two earlier reports are available on request from the Department of Chemistry, Purdue University, Lafayette, Indiana.

Psychology and the professor in charge of its introductory course.[2]

Each of the 70 S s was randomly assigned to one of the following five instruction-testing conditions:

1. Televised laboratory instruction with criterion measurements taken within about two hours of the completion of the instructional presentation.

2. Televised laboratory instruction with criterion measurements taken during a session held five weeks after the instructional presentation was given.

3. Conventional laboratory instruction with criterion measurements taken within about two hours of the completion of the instructional presentation.

4. Conventional laboratory instruction with criterion measurements taken during a session held five weeks after the instructional presentation had been given.

5. No laboratory instruction—criterion measurements gathered from one random half of this group on the evening during which instructional presentations were given. Measurements were gathered from the second random half of the group during the session held five weeks later.

Instructional presentations to which the S s were exposed were based on the contents of two sound films prepared by the Department of Chemistry within the project supported by The Fund for the Advancement of Education. The film contents were supplemented somewhat by the two instructors who prepared and gave the instructional presentations.[3] One film, with a running time of about six and a half minutes, covers techniques of mass determination and the various types of balances; it also gives particular attention to the use of the triple beam balance. The other, with a running time of about eight and a half minutes, covers the apparatus and procedures for making volumetric measurements.

The first session with the S s was devoted to a brief and necessarily vague introduction to the study, to pretesting, to the instructional presentations, and to the gathering of criterion data from one random half of the group of S s. In the introduction, S s were told that patience and reasonable efforts were expected of them, that they should not communicate with others concerning participation in the study, and that each would receive an explanatory report on the study after the data had geen gathered and examined. Pretesting consisted of gathering responses to the customary personal data items and the administration of a vocabulary test.

Following the pretest, S s were divided into three groups as determined

[2] There were 12 S s in the initial group of 70 volunteers who had extensive previous chemistry training and were judged not to be suitable for this study. They were eliminated from the list of participants and substitutes were obtained prior to the random assignment of S s to instruction-testing conditions. "Random," as applied here and elsewhere in this paper, refers to the use of random numbers tables in determining conditions applicable to each participant or prospective participant.

[3] The "instructor variable" presents a universal problem in studies such as this one and steps were taken to minimize its effects. The two instructors were familiar with the purposes and procedures of the study and particularly familiar with the nature of the criterion data to be gathered. They were in close contact as each prepared his presentation. In addition, both hold the Ph.D. degree in physical chemistry and have had teaching experience suited to the tasks performed. In the opinion of the writers, these considerations make it unlikely that instructor differences contributed significantly to the outcomes of the study.

by a previously prepared random assignment plan. These groups were composed of those S s who would receive televised instruction, those who would receive conventional instruction, and those who would receive no instruction. Each group was assigned to one of three adjacent rooms. Care was taken to prevent sound transmission between the rooms during instructional presentations. The two presentations lasted 20 to 30 minutes, the televised presentation perhaps five mintues longer than the other. Following this, the random assignment plan was again used to identify and release those S s whose criterion data were to be gathered at a later date. An 18-item test covering material from the presentations was administered to the remaining S s. Twelve were four-alternative multiple choice items, and the rest were matching items.

The last activity in this first session with the S s was to gather laboratory performance evaluations. Each S was required to carry out a relatively simple titration while performance of each was evaluated by an assigned graduate student. All evaluators were volunteers who had been briefed concerning the pitfalls and specific duties of the evaluator. Immediate, accurate recording and a pleasant but noncommittal attitude toward the S s were particularly stressed. The comments and evaluations were recorded on specially prepared, itemized scoring sheets and no evaluator [4] received advance information concerning the group to which any given S belonged. Also, since only eight S s could be evaluated simultaneously, their order of appearance for laboratory evaluations was made dependent upon a previously prepared random order plan.

Five weeks after the first session with the S s, the second and last session was devoted to the same testing and evaluation activities as had been involved in the latter part of the earlier session. The S s who reported for this session were those who had been randomly assigned to the "delayed measurement" condition. There were also "non-instructed" S s who were reporting for the first time and the first few minutes were therefore devoted to introducing them to the study procedures and gathering their responses to personal data-vocabulary test items.

Tests and Performance Evaluations

The personal data-vocabulary test form was prepared to permit a description of the sample and to provide the covariate for subsequent analyses of criterion data. The vocabulary test included 24 four-choice, multiple-choice items; its Kuder-Richardson Formula 20 reliability (7, p. 586 ff.) was found to be .740. The test was scored with unit weights for each item and no correction for wrong responses.

The 18-item knowledge test, one of the two criterion measures used in the study, was developed from the two film scripts and pretested twice in introductory chemistry classes. Prelim-

[4] The one exception to this was that the instructor who presented "conventional instruction" also served as a second, or duplicate, evaluator of five S s' performance. Evaluations he supplied were used only in estimating the rater-to-rater reliability of evaluations, rather than as principal indexes of performance skill. The other of the second, or duplicate, evaluators was the television instructor but he, of course, had not seen S s in "his" group and could not identify them by other means.

inary forms of the test were item analyzed after both pretestings and items were deleted or rewritten on the basis of information gathered. All items appeared to be functioning satisfactorily in the second pretesting and only minor modifications were introduced in the preparation of the test form used in this study. Scoring involved unit weights for each item and no correction for wrong responses. Data gathered from the 60 S s in the study indicated that this test had a Kuder-Richardson Formula 20 reliability of .672.

The laboratory performance evaluations were included to provide the S s with a task which had been described and demonstrated during the earlier presentations and to measure skills in executing the task. Evaluators' scoring sheets included a listing of the 14 procedural steps to be followed by the S s, a listing of appropriate subtopics within each step, and indications of the credit points to be granted for any level or type of performance. Thus, the evaluators were primarily concerned with observing closely, matching observed performance with the most appropriate performance description listed on the scoring sheet, and recording any comments that seemed to be required.

Each S received a performance outline at least several minutes prior to appearance in the laboratory and this outline listed the 15 main steps to be followed in executing the titration; it did not specify details of procedure. Evaluators were specifically instructed not to assist S s, either directly or by subtle cues, except when the observed poor performance would nullify the adequacy of S's subsequent efforts. Evaluators were instructed to give no credit for poor performance that required correction. To check the reliability of these evaluations, duplicate evaluations were obtained for an unselected sample of ten S s. The two chemistry instructors who had given the instructional presentations made these evaluations and, although there was some information exchanged between evaluators scoring the same performance, the majority of the judgments was rendered independently. The rank order correlation between the sets of paired evaluations was .888.

Preliminary Findings

Attrition of the student sample during the course of the study did not prove to be a problem of serious proportions since all but six of the 70 S s appeared and participated; these six included representatives from four of the five groups. Excess data were randomly eliminated as planned. The S s whose data are included in the following analyses had a mean age of 20.48 years and an age range from 18 to 44. They included 31 female and 29 male students from the schools of engineering, agriculture, home economics, science, education, and the humanities.

Vocabulary pretest scores from the five groups of S s were analyzed by means of a single classification analysis of variance (5, p. 315ff.) as a check on the initial intergroup comparability. The mean vocabulary pretest scores from the groups were as follows: TV-immediate measurement, 15.17; TV-delayed measurement, 16.00; conventional-immediate measurement, 14.75; conventional-delayed measurement, 16.08; and no instruction, 16.67. The F-ratio from the analysis of variance was .453 (with 4 and 55 df.); differences among the

means are not statistically significant and the groups can be considered comparable.

Results of the Study

Single classification analysis of covariance (12, p. 387ff.) was used to treat data from the two criterion, or learning, measures. Vocabulary pretest scores served as the covariate in both of these analyses. Summaries of the results are presented in Tables 1 through 4.

Both the initial and the adjusted mean scores shown in Table 1 suggest that which is demonstrated by the F-ratio in Table 2; test performance differences among the five groups were not statistically significant. It is apparent that, although the 18-item knowledge test had face validity and evolved out of seemingly less "polished" versions, it was inadequate when employed as a discriminating criterion of learning in the present sample. More evidence on this subject is presented later.

Laboratory performance mean scores for each of the five groups are shown

TABLE 1—INITIAL AND ADJUSTED CHEMISTRY KNOWLEDGE TEST MEANS FOR THE FIVE GROUPS (N=12, EACH GROUP)

	Television		*Conventional*		*No*
	Immediate	*Delayed*	*Immediate*	*Delayed*	*Instruction*
Mean Score	10.167	12.417	10.500	12.250	10.750
Adj. Mean	10.236	12.384	10.620	12.207	10.636

TABLE 2—SUMMARY OF COVARIANCE ANALYSIS INVOLVING CHEMISTRY KNOWLEDGE TEST SCORES

Source	*SS*	*df*	*V*	*F*	*p*
Treatments	47.7261	4	11.9315	1.379	>.05
Error	467.2467	54	8.6527		
Total	514.9728	58			

TABLE 3—INITIAL AND ADJUSTED LABORATORY PERFORMANCE MEANS FOR THE FIVE GROUPS (N=12, EACH GROUP)

	Television		*Conventional*		*No*
	Immediate	*Delayed*	*Immediate*	*Delayed*	*Instruction*
Mean Score	61.000	56.750	60.250	60.250	50.417
Adj. Mean	61.420	56.552	60.919	59.991	49.725

TABLE 4—SUMMARY OF COVARIANCE ANALYSIS INVOLVING LABORATORY PERFORMANCE SCORES

Source	*SS*	*df*	*V*	*F*	*p*
Treatments	1112.3487	4	278.0871	3.068	<.05
Error	4895.1866	54	90.6516		
Total	6007.5353	58			

in Table 3 and a summary of the corresponding analysis of covariance is shown in Table 4. Information from these two tables gives adequate indication of the significant performance differences existing among the five groups. The F-ratio reported in Table 4 (3.068, with 4 and 54 df.) indicates significance somewhat beyond the .05 level of confidence. A review of Table 3 will show a relatively tight grouping of means from the four instructed groups but a noticeable gap between them and the mean from the non-instructed group. The difference between the adjusted means from the two delayed measurement groups was tested with the appropriate *t*-test and the obtained *t* was .884, considerably less than required for significance at the .05 level of confidence.

Further treatment of the data was prompted by the fact that both instructors emphasized certain portions of the presented material, perhaps at the expense of other portions on which S s were later tested and evaluated. Because of this it was suspected that certain items and steps in the two criterion measures would not effectively discriminate between instructed and non-instructed S s. Therefore, each instructor was asked to check a copy of the knowledge test and the laboratory performance scoring sheet and to indicate the items and steps which had, in his opinion, received attention in the instructional presentation he had given. Indications received from the instructors and item-by-item (or step-by-step) tabulations of the results from each of the five groups are presented in Tables 5 and 6.

Information in Table 5 gives further indication of the inadequacies of the 18-item knowledge test. Only items 2, 8, and 16 provided even the mildest indications of their ability to discriminate between instructed and non-instructed groups and these item "successes" are too minute to be regarded as reliable. It can again be seen that the attempt to develop a reasonably valid and sensitive measure of acquired knowledge was, to say the least, unsatisfactory.

Information in Table 6 is more consistent than that in Table 5 and shows, among other things, that the performance level of all instructed groups was above that of the non-instructed group on eight of the 14 performance steps. Step-by-step comparisons of the summed performance of television- and conventionally-taught groups show seven steps (nos. 3, 4, 7, 9, 10, 11, and 12) on which television S s were slightly superior, five steps (nos. 1, 2, 6, 13, and 14) on which conventionally-taught S s were slightly superior, and two steps (nos. 5 and 8) on which the differently-taught groups performed equally well.

Instructors' indications of content coverage, as shown in Table 6, provide information of interest, even though not in complete accord with the measured levels of laboratory performance. For example, step 3 gives indication of disagreement between instructors' statements and measured performance; the Table shows that only the conventionally-taught S s received instruction appropriate to this step, yet the television S s showed some superiority in executing the step. Also, on step 9, only the television instructor indicated (partial) coverage of appropriate material, yet all instructed groups executed this step

TABLE 5—INSTRUCTORS' INDICATIONS OF CONTENT COVERAGE AND POINTS EARNED BY EACH GROUP ON EACH ITEM IN THE CHEMISTRY KNOWLEDGE TEST

Test Item	*Material Covered in:*		*Television*		*Conventional*		*No*	
	TV	*Conventional*	*Immed.*	*Delay*	*Immed.*	*Delay*	*Instr.*	*Total*
1			10	8	5	8	6	37
2	yes	yes	10	12	11	10	9	52
3		yes	3	7	3	5	7	25
4	yes	yes	1	4	2	5	6	18
5	yes	yes	4	6	7	7	6	30
6	yes	yes	6	11	7	11	10	45
7	yes	yes	11	10	10	12	10	53
8			11	9	12	9	8	49
9	yes	yes	2	4	5	5	3	19
10	yes	yes	2	9	4	7	2	24
11			7	10	7	11	7	42
12	yes	yes	11	10	10	11	11	53
13	yes		0	3	3	5	5	16
14	yes		12	11	10	12	12	57
15			9	11	8	7	9	44
16	yes		4	3	5	3	0	15
17			10	11	9	11	9	50
18			9	10	8	8	9	44
All	11	9	122	149	126	147	129	673

TABLE 6—INSTRUCTORS' INDICATIONS OF CONTENT COVERAGE AND POINTS EARNED BY EACH GROUP ON EACH STEP OF THE LABORATORY PERFORMANCE EVALUATION

Lab. Step	*Material Covered in:*		*Television*		*Conventional*		*No*	
	TV	*Conventional*	*Immed.*	*Delay*	*Immed.*	*Delay*	*Instr.*	*Total*
1			98	88	101	100	100	487
2	yes	yes	102	103	122	111	87	525
3		yes	51	56	44	47	45	243
4	?		34	34	30	33	27	158
5			34	34	33	35	33	169
6			60	51	60	54	57	282
7	yes		34	34	31	30	24	153
8	?		21	22	21	22	16	102
9	?		78	68	60	70	47	323
10	yes	yes	63	53	57	55	51	279
11			20	12	18	13	13	76
12			36	33	33	33	33	168
13	yes	yes	57	49	63	70	39	278
14	yes	yes	44	44	50	50	33	221
All	8*	5	732	681	723	723	605	3464

* The eight steps reportedly covered during the televised presentation include three steps which, by instructor indications, had received limited or incomplete coverage.

more adequately than the non-instructed S s. On the positive side, those steps which reportedly received adequate coverage in both presentations (nos. 2, 10, 13, and 14) were among the steps which apparently discriminated between performance of instructed and non-instructed S s.

Conclusions

In this brief study, all reasonable efforts were made to gain control over extraneous variables while gathering limited but valid information concerning the relative effectiveness of televised and conventional instruction in laboratory skills. There are unanswered questions concerning the methods, the effects, and the meanings which still outnumber the few questions which may have been answered but these should not obscure what was attempted and found. In brief, the results indicate that one of the two criteria employed in the study was little more than worthless. The other criterion measure gave evidence that, although the instruction produced measureable effects, it apparently made no difference whether groups were taught by conventional means or by means of television. Statistically, these instructed groups performed equally when executing their laboratory tasks. This evidence is not contradicted by related information from the earlier and more extended trials of televised laboratory instruction.

Perhaps, at best, the inclusion of "delayed measurement" groups has added some small amount of respectability to this study. Their inclusion certainly has not guaranteed that unequivocal answers can be given to those questions which deal with the "long-term" effects of the two forms of instruction. Since these "long-term" effects are extremely important, it is hoped that they will receive increasing attention in the future.

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Student Attitudes Toward Closed-Circuit Instructional Television

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APPROXIMATELY 37 colleges and universities are currently utilizing closed-circuit television; 22 are studying its possibilities for instruction.[1] Questions arise as to the relative effectiveness of television and traditional teaching techniques, and attitudes toward the former. This paper reports a study of student attitudes toward a course partially presented on closed-circuit television.

METHOD

An engineering course offered at the University of Illinois during the fall semester of 1958 and designed to familiarize students with the resistance of materials was utilized for the study. The course traditionally met once a week for a two-hour period which was usually consumed by a lecture-demonstration, short discussion, and quiz. Approximately 12 students, meeting in a laboratory with an instructor, were accommodated in each section. The laboratory equipment, used for demonstration purposes only, was not handled by the students.

Although over 100 students take this course each semester, it has been taught in small laboratory sections, not only because most of the equipment cannot be moved to larger lecture halls, but also because these larger rooms do not

[1] National Education Association, American Association of Colleges for Teacher Education. *Closed-Circuit Television in AACTE Member Institutions.* Committee on Studies and Subcommittee on Television and Teacher Education, Bulletin Vol. 9, No. 5, May 16, 1958.

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give the students an adequate view of the demonstrations. Therefore, this course was well suited for teaching via television. The showing of laboratory equipment to a large body of students at one time prevented costly duplication of running the electrically driven machinery, and the television camera was able to present to every student a large, clearly defined picture of occurrences. During the first semester in which the course was taught via closed-circuit television it was offered both over television and in the traditional manner. This offered an opportunity to compare results.

General plan of the experiment. Ten sections were selected for the experiment, five of which were taught in the conventional manner and five via television. All sections contained about 12 students. The conventional sections were taught as in the past, meeting weekly for a two-hour period of lecture-demonstration, discussion, and quiz. Each was taught by a different instructor. The television sections also met once a week for a two-hour period. For the lecture-demonstration, all students assembled in a single large room equipped for television viewing. Either at the end of the televised lecture, or at some other time during the two-hour period, the group would break up into sections of about 12 each for discussion periods, weekly quizzes, or other examinations. Each television section had its own instructor who took his turn preparing and delivering the televised lectures.

Subjects. All subjects were male—52 in the experimental group and 60 in the control group. Grade-point averages of the two groups did not differ significantly. When the students registered for the course at the beginning of the semester, they did not know whether they would be in a television or conventional section. All foreign and some transfer students were eliminated from the study because of difficulty in obtaining certain necessary variables.

Test Material. At the end of the course all students in the experiment were administered a questionnaire designed to measure the attitudes of the students toward the course and the way it was taught. A special form of the Semantic Differential [3] was developed. Subjects were asked to rate the following concepts: "Teaching where the instructor is in the classroom," "Teaching where the instructor is on television," "This course," and "Your instructor(s) in this course." The following scales were used: worthless-valuable, unpleasant-pleasant, clear-hazy, unfair-fair, good-bad, successful-unsuccessful, meaningful-meaningless, wise-foolish, confusing-understandable, boring-interesting, and simple-complicated. A sample page of the Semantic Differential is shown here:

THIS COURSE

worthless_:_:_:_:_:_:_valuable
unpleasant_:_:_:_:_:_:_pleasant
clear_:_:_:_:_:_:_hazy
unfair_:_:_:_:_:_:_fair
good_:_:_:_:_:_:_bad
successful_:_:_:_:_:_:_unsuccessful
meaningful_:_:_:_:_:_:_meaningless
wise_:_:_:_:_:_:_foolish
confusing_:_:_:_:_:_:_understandable
boring_:_:_:_:_:_:_interesting
simple_:_:_:_:_:_:_complicated

[3] Osgood, C. E.; Suci, G. J.; and Tannenbaum, P. H. *The Measurement of Meaning.* Urbana, Illinois: The University of Illinois Press, 1957.

In addition, the following questions were asked:

> How well did you understand the purpose of laboratory experiments in this course?
>
> By watching experiments, how clearly did you perceive the physical relation between controls, dials, and the specimen?
>
> Were you confused about these or was the over-all picture clear?
>
> How efficiently was the laboratory time utilized?
>
> How well, do you think, will you be able to describe what you learned in this course six months from now?
>
> How clearly did the course bring out the relation between physical behavior in the laboratory and theoretical formulations developed?
>
> In making a general comparison with other engineering courses you have taken, how would you rate this course?
>
> On the average, how much time per week did you spend on this course outside of class?
>
> If you have the option next semester of enrolling in either a TV section or a conventional section of this course and if both sections are taught by the same instructor (whom you like) and are given at desirable hours which fit in with your schedule, which section will you choose?

The following information was also obtained for each subject in the experiment: cumulative university grade-point average; mid-term examination grade; and final course grade.

Administration of test materials. Because we wanted the frank opinions of the students, we were concerned that their answers not be motivated by the fact that they had not yet received their final grades. Therefore we assured them that their responses would in no way affect their grades. To put them even more at ease, one student in each section, selected at random, collected all copies of the questionnaire and held them until the final grades had been posted.

ANALYSIS AND RESULT

Means and standard deviations were computed on each item in the questionnaire for both the experimental and the control group, and the two groups were compared on each item. In addition, mid-term and final grades were computed and compared.

With respect to the first objective of this study—evaluating the relative effectiveness of closed-circuit television teaching as compared to conventional teaching—no differences were found. Neither the mid-term examination grade nor the final course grade differed significantly between the two groups.

However, the examination of the acceptability of closed-circuit television showed striking differences. When asked to rate the concept "This course," the two groups differed significantly on 10 out of the 11 scales. The television group rated the course less pleasant ($p=.001$), less clear ($p=.001$), less fair ($p=.01$), less good ($p=.01$), less successful ($p=.001$), less meaningful ($p=.05$), less wise ($p=.01$), less understandable ($p=.001$), less interesting ($p=.05$), and less simple ($p=.05$), than did the conventional group. The only scale that did not differentiate between the two groups was *worthless-valuable*.

When asked to rate the concept "Your instructor(s) in this course," the two groups differed significantly on eight out of the 11 scales. The television group rated their instructors as being less valuable ($p=.001$), less clear ($p=.01$), less fair ($p=.001$), less good (p

=.05), less successful (p=.001), less meaningful (p=.01), less wise (p=.001), and less interesting (p=.05), than did the conventional group. The scales that did not differentiate significantly between the groups were: *confusing-understandable, simple-complicated,* and *unpleasant-pleasant.*

When asked to rate the concept "Teaching where the instructor is on television," the two groups differed significantly on only one scale; the television group considered it less understandable (p=.01), than did the conventional group. There were no significant differences between the groups on the concept "Teaching where the instructor is in the classroom."

The questions concerning the course itself showed similar results as indicated by the following:

> *How well did you understand the purpose of laboratory experiments in this course?*
>
> The television group stated that they understood less clearly (p=.001) than did the conventional group.
>
> *By watching the experiment, how clearly did you perceive the physical relation between controls, dials, and the specimen? Were you confused about these or was the overall picture clear?*
>
> The television group stated that it was less clear (p=.001) than did the conventional group.
>
> *How clearly did the course bring out the relation between physical behavior in the laboratory and theoretical formulations developed?*
>
> The television group stated that the relation was less obvious (p=.05).
>
> *How well, do you think, will you be able to describe what you learned in this course six months from now?*
>
> The television group stated that they would do less well (p=.05).
>
> *In making a general comparison with other engineering courses you have taken, how would you rate this course?*
>
> The television group rated the course poorer (p=.001).

The groups did not differ on the question "How efficiently was the laboratory time utilized?" The television group stated that on the average they spent more time on the course outside of class than did the conventional group (p=.01). Sixty-five percent of the students in the television section stated that they would prefer a conventional section were they to take the course over, 27 percent would take a television section, and 8 percent expressed no choice. Eighty-four percent of the students in the conventional section stated that they would prefer a conventional section were they to take the course over, 8 percent would take a television section, and 8 percent expressed no choice.

We also examined the relationship between students' university grade-point averages and the question pertaining to preferences. The better the student the more likely he was to prefer a conventional section (p=.05).

DISCUSSION

When we consider the first objective of this study (the relative effectiveness of closed-circuit television compared to conventional teaching), it appears that there is no difference. The study failed to show differences in performance when measured by a mid-term examination or a final course grade.

When we consider the second objective of this study (the acceptability to the students of closed-circuit television teaching) the results are clear. The Pennsylvania State University Studies

(using other techniques) reported that students' general attitudes toward televised instruction as compared with direct instruction were "mainly neutral or slightly negative," but they found no significant differences.[4] Our results clearly show that television students have relatively negative attitudes toward the course and the instructors of the course as compared to the students in the conventional sections.

With respect to the relative efficiency of the two methods of teaching, it is noted that the students in the televised sections stated that they spent more time on the course outside of class than did the students in the conventional sections, but their performances on the examinations were the same.

[4] Carpenter, C. R.; Greenhill, L. P.; and others. *An Investigation of Closed-Circuit Television for Teaching University Courses.* Instructional Television Research Project No. 1, Instructional Film Research Program, July 31, 1955. University Park: Pennsylvania State University, p. 1.

SUMMARY

The objectives of this study were to examine (1) the relative effectiveness of closed-circuit television for classroom teaching compared to conventional teaching and (2) the acceptability of closed-circuit television teaching to the students. A course was offered both by closed-circuit television and by conventional teaching. Students within each group were asked to rate the course and other related concepts. In addition, their examination grades were obtained. No differences were found with respect to performance. The students taught via television rated the course and their instructors relatively lower than those who received conventional instruction.

REPORT ON THE ADMINISTRATION OF EDUCATIONAL FILM ACTIVITIES IN 14 COUNTRIES PART II

A Survey Made for UNESCO by the International Council for Educational Films

SEE the Fall 1959 issue for Part I which comments generally on the 14 countries treated individually here. The first half of the survey reveals that film industries in most of the 14 countries undertake the production of educational films, but in some countries, production is either entirely governmental or governmentally sponsored or undertaken by private producers. The distribution of educational films is often handled by a government agency for more effective centralization, less expense, and better quality of materials offered to schools. Local financing of educational film activities follow the general principles of the school system in each country—either it is municipal (tax supported) or it is private with different degrees of municipal support. To help solve the problem of insufficient teacher training facilities, some government institutions, universities, and film centers have organized inservice training for teachers, and are now offering courses for special certificates in the audiovisual field.

Austria

This country presents perhaps the most typical example of a pyramid of administration, developed from the central level downwards. Institutions on all three levels are operated by the federal government and the province (Lander) governments.

The nucleus of the Austrian system is an institution under the Federal Ministry of Education, the Federal Center for Picture and Educational Film (Bundesstaatliche Haupstelle fur Lichtbild und Bildungsfilm). This federal center forms the roof of a country-wide organization, consisting of nine provincial centers (Landesbildstellen) and 92 local centers (Lokale Bildstellen). The administrative costs for all these centers are covered by a special federal budget of about $120,000.

The production of educational films for schools is centralized at the federal center, and prints are deposited with the provincial and local centers. Production and printing costs are covered by a special budget of about $80,000 resulting from pupils' contributions which are compulsory and are higher in secondary schools than in elementary schools.

Provincial centers produce some simple films of local educational interest. The yearly release of new titles from the federal center is increasing. Seven new titles were released in 1950, 24 titles in 1955. There is a marked dominance of film imports over home production as well as of films for secondary schools over films for elementary schools. The number of films available to schools has grown from some 380 titles (28,000 prints) in 1950 to some 500 titles (50,000 prints) in 1955. All films are silent and black-and-white. There is no tendency to change to sound or color. It is estimated that some 80 prints of a film for secondary schools and 120 prints of a film for elementary schools are hardly sufficient to meet the demand.

The schools have at their disposal approximately 3900 16mm film projectors, of which some 3850 are silent and only 50 sound. The purchase of all projectors is channeled through the federal center. Municipalities buy projectors for elementary schools; the federal government for secondary schools. The films are supposed to be shown in classrooms that are equipped with facilities for darkening. Daylight projection is not practiced.

Apart from the leaders of the local film centers, there are no film supervisors or coordinators in the municipalities or schools.

Training in the use of audiovisual media is compulsory in teachers colleges, with from four to 12 hours devoted to this subject. The training includes pedagogic methods, projection technique, and classroom practice. Inservice teachers may get further training in courses arranged by the film centers. Film expression and film art is taught in noncompulsory courses for inservice teachers.

Belgium

The pyramid of administration has developed from the central level downwards. A regional level does not exist.

A special bureau of the Ministry of Education (Le Service Cinematographique du Ministere de l'Instruction Publique) is responsible for production and distribution of educational films for schools, working on a budget of about $290,000. For the time being it rarely produces films but concentrates on import.

Sixty-two titles were released in 1950, 65 titles in 1955.

The number of films available to schools has grown from some 690 titles (1900 prints) in 1950 to some 1610 titles (8550 prints) in 1955. There is a clear tendency towards a preference for sound films as well as towards the introduction of color films.

It is calculated that some 12 prints of a film are sufficient to cover the demand.

The governmental center distributes the films free of charge to the schools, which do not receive any other subsidy, either provincial or municipal, for their film activities.

The schools have at their disposal approximately 2700 16mm film projectors, out of which some 200 are silent and 2500 sound. State schools are given projectors free of charge from the governmental center; other schools do not receive any support for the purchase of projectors. In new schools the films are mostly shown in special screening rooms. Otherwise, classrooms are used. All such localities are equipped with darkening facilities, and daylight projection is not practiced.

Normally, one of the teachers in a school acts as a coordinator for film activities. Contrary to the school librarian, he is, however, not specially remunerated for this work.

No compulsory teacher training in the use of audiovisual media exists, and film expression and art is not taught. Certain audiovisual courses for inservice teachers are given by a Catholic organization (the CEDOC).

Canada

There is no country-wide administrative pyramid. Education is a responsibility of the province, and in each province the pyramid has developed from the regional level downwards.

A federal institution for the production and distribution of films exists (the National Film Board of Canada), but only a very small part of its activities is devoted to films for schools. Normally, not more than two or three educational films for schools are produced per year. These are produced under the guidance of a special subcommittee of the Canadian Education Association, a cooperative body representing the provincial school authorities.

Otherwise, the production and central distribution of educational films is undertaken by private enterprise. Home production is insignificant, and films are imported predominantly from the United States, the United Kingdom, and France. It has been impossible to calculate the number of new film titles released in the country each year.

In order to cover the demand, approximately 50 to 75 prints of a film for elementary schools and about five to 20 prints of a film for secondary schools are found to be necessary.

In each province, the school authorities maintain an educational film library. The number of film titles in these libraries vary from 500 to 2500, and the number of prints from 1000 to 6000. Practically all are sound films, and the percentage of color films is rapidly increasing. In two provinces there is a censorship on educational films; in some others the provincial authorities advise the schools on the quality of films to be used.

About 500 local film libraries exist, administered by the municipal school authorities. They are in various ways and to varying degrees supported by the provincial authorities. The bigger libraries are complete audiovisual centers in Toronto and Vancouver. All libraries distribute their films to the schools at expedition cost. Some universities also distribute films to schools. The schools have at their disposal approximately 6000 16mm film projectors. Nearly all are sound projectors; silent projectors are no longer bought. Projectors are purchased by the municipal school authorities, which in some provinces receive a governmental subsidy covering 50 percent of the costs. Many rural schools make use of projectors that circulate with the National Film Board's traveling units for showing films that they borrow from local or provincial libraries. The films are preferably shown in darkened classrooms, although in most schools only a few classrooms are equipped with darkening facilities. Daylight projection is not popular.

In many parts of the country, there are coordinators of audiovisual aids either for a school or a school district. They are teachers, and their position is rather similar to that of school librarians.

They are not specially remunerated but are, at least in larger districts, allowed a certain amount of hours off for their work.

Although teacher training in the use of audiovisual aids is not compulsory, most institutions give such training. Elementary school teachers normally receive more training at teachers colleges than secondary school teachers receive at the universities. Inservice teachers get further training in courses organized by coordinators or municipal and provincial authorities. In Ontario, a yearly course for 60 teachers leads to qualification for posts as coordinators. Film expression and art is covered only when there is special interest on the part of the instructor.

Denmark

The pyramid of administration has developed from the central level downwards with governmental institutions at central and regional levels.

Production is undertaken by the Danish Cultural Films (Dansk Kulturfilm), a private institution, governmentally supported and controlled. Only a minor part of its $60,000 budget is, however, devoted to educational films for schools.

The Danish Government Film Office (Statens Filmcentral) is responsible for film import and distribution, and works with a budget of about $150,000. Its activities include adult education, children's entertainment films, et cetera.

About 60 new film titles are released each year by the governmental center. Most of the films are imported. Some 220 titles were available to schools in 1950, some 450 titles in 1955. Most of the films are silent and black-and-white, but the percentage of sound and color films is increasing. In order to cover the demand, some 20 prints from a silent film and some 10 prints from a sound film are normally needed.

The films are distributed directly from the governmental center to the schools, and a number of prints are deposited in a regional branch office in order to facilitate transport. The schools get the films either on a yearly subscription or under a rental system. A number of local film libraries have recently been created, based on a 10 years' print lease system. Prices are kept very close to the expedition cost level. Municipal school authorities cover the local costs for film supply.

The schools have at their disposal approximately 1800 16mm film projectors, of which some 1500 are silent and some 300 sound. The number of sound projectors is increasing. The projectors are bought by the municipal school authorities, which can receive a governmental subsidy for this purpose. In new schools, the films are shown most often in an auditorium with darkening facilities. In older schools, normally one classroom may be darkened and used as a film room. Daylight projection is not practiced.

Film or audiovisual coordinators or supervisors do not exist, except in the city of Copenhagen where there is one such post, comparable to that of an assistant headmaster.

Teacher training in the use of films is compulsory. It is arranged by courses given with the assistance of the governmental film center. In such courses, groups of 30 future teachers are given a six hours' all-round training. Courses, lectures, et cetera, for inservice teachers are also given free of charge by the

governmental center at the request of schools or teachers groups. Film expression and art is not covered by such courses, but literature on these subjects is available to the participants.

France

The pyramid of administration has developed both from the central level downwards and from the local level upwards. Governmental institutions exist on the central and regional levels, but other regional institutions are financed and administered by provincial or local school authorities.

Under the Ministry of Education, a special institution—the National Pedagogic Institute (l'Institut Pedagogique National)—is responsible for the supply of educational films to schools. It is guided in this respect by the Governmental Committee for Educational Films (Commission Ministerielle du Cinema d'Enseignement). Production is carried out approximately as follows:

One-third by the audiovisual center in St. Cloud (Centre Audio-Visuel de l'Ecole Normale Superieure de St. Cloud), the official production unit of the Ministry of Education, which produces mainly experimental, pedagogical and scientific films. It is a pilot unit.

One-third by private companies under contract signed with the Institut Pedagogique National.

One-third by private companies, on scenarios approved by the Commission Ministerielle du Cinema d'Enseignement, under contract signed with trade unions or private industrial concerns and sometimes with subsidies from the IPN.

The Centre Audio-Visuel de St. Cloud also makes French versions of imported foreign films, re-edits film footage for educational versions, and helps universities and teachers in local productions.

The total price of these productions, as well as the sponsorship of certain private productions, is covered by a budget of some $350,000. The figures given above cover only the production made under the sponsorship of the Ministry of Education. Approximately 100 other educational films are produced every year by French private companies on their own or under the sponsorship of other ministries or private concerns.

The yearly release of new film titles through the libraries has increased between 1950 and 1955 from 20 titles to over 100. About one quarter of these releases are imported, and they are almost equally divided between elementary and secondary school levels. Production of color films is increasing, although some color titles are distributed also in black-and-white versions because of the lower printing costs. The number of educational films available to schools has increased from some 160 titles in 1950 to some 400 titles in 1955. It is calculated that to cover the demand some 150-200 prints are needed from films for elementary schools and some 30-50 prints from films for secondary schools.

The National Institute maintains a central film library, mainly intended to serve secondary schools. It also finances and administers 17 regional film libraries, intended to serve both secondary and elementary schools. The films in these libraries are available to all public schools on a subscription basis, and subscribing secondary schools receive a special subsidy from the Ministry of Education for this purpose. Prints are also sold to 30 provincial film libraries (Cinematheques de Departements),

mainly intended to serve elementary schools. The National Institute pays the staff salaries for these provincial film libraries, but their film budget is carried by provincial and local school authorities. Finally, prints are sold to a number of local film libraries in large cities and important schools, financed by the local school authorities. It should be noted, however, that private schools are allowed neither to subscribe to regional film library programs, nor to purchase prints of governmental films.

Schools have approximately 8000 16mm film projectors at their disposal. Very few silent projectors are used. For the purchase of projectors, schools receive various types of governmental subsidies. Generally, films are shown in the classrooms, but in big schools specifically equipped film rooms often exist. Room darkening is preferred to daylight projection.

There are generally no film supervisors or coordinators in the schools. For secondary schools, however, a system of National Institute "correspondents" has been planned, but this system is not yet functioning.

Teacher training in the use of visual aids is compulsory, but due to lack of competent instructors many teachers have not received this training. The audiovisual center arranges, in cooperation with various institutions and organizations, regional courses of from two to three days and central courses of from eight to 15 days, both for future and in-service teachers. Certain central courses of a considerably more extensive nature are also given each year. In all central courses, certain elementary production techniques are taught, and several hours are always devoted to film expression and art. The creation of teachers and youth film societies (cine-clubs) is promoted.

The Federal Republic of Germany

The pyramid of administration, one of the most effective among the existing systems, has developed from the regional level both upwards and downwards. The educational authorities of the provinces (Lander) carry the budgets of both the central and regional institutions.

The Educational Film Institute (Institut fur Film und Bild in Wissenschaft und Unterricht) in Munich functions as the central body for production and distribution. It is not supported by the federal government, but its budget is carried cooperatively by the Lander with yearly subscriptions based on the number of pupils in the schools. The Institute produces films of its own, but most of the releases are films bought from other producers in and outside the country.

Thirteen new titles were released in 1950, and 63 titles in 1955. The total number of films available to schools was 350 in 1950, and 520 in 1955. Most of the films are silent and black-and-white, but the number of sound films is increasing, and color films have recently been introduced. Some 600 prints of a film for elementary schools may be needed to cover the demand.

Prints of the films are sold by the Institute at prices slightly over printing costs to the 13 province film centers (Landesbildstellen) or channeled through them to more than 500 regional (Kreisbildstellen) or municipal (Stadtbildstellen) centers administered by local school authorities. All these centers function as complete audiovisual service institutions, and the province film centers can also undertake certain simple pro-

ductions of local interest. The centers distribute the films free of charge to schools.

The schools have at their disposal approximately 22,000 16mm film projectors, of which some 20,000 are silent and some 2000 sound. There is, however, a marked tendency towards the purchase of sound projectors. Local school authorities pay for the projectors, but they receive subsidies for this purpose from the Lander governments through the province film centers. Films are mostly shown in classrooms with darkening facilities, but some new schools have special film rooms. Daylight projection is not practiced in ordinary schools (it exists, however, in some vocational schools).

There are no coordinators in the schools or school districts, but the leader of the local or regional film center is usually a teacher. He is not specially remunerated for this work but his expenses are covered. The province film centers are equipped with fulltime staff.

Teacher training in the use of audiovisual aids is not compulsory, but all film centers are very active in the promotion of effective film usage by arranging courses, conferences, and lectures for all categories of teachers. Teachers take a growing interest in film expression and art, and the Educational Film Institute endeavors to present material for such studies. Some films have been produced for this purpose.

Italy

A new law, regulating educational film activities, has been expected for several years. In the meantime, the situation seems somewhat unclear. The pyramid of administration has developed from the central level downwards, but recently more weight has been put on the regional level, and in reality local efforts play a more essential part than may be expected from the organization plan.

Within the Ministry of Education, a special institution for educational films exists for both production and distribution (Cineteca Scolastica). Because of an insufficient budget—some $30,000 per year—its production has, however, been severely restricted during past years. Because of this, a number of private producers have greatly increased their release of educational films.

In 1955, close to 50 new titles were released and the number of films available to schools was brought up to some 150 titles. Most of these titles are black-and-white sound films, but color films have also been introduced. To cover the demand from the elementary schools, some 100 prints of a film may be needed.

The films are rented to schools, and Cineteca Scolastica maintains a subscription system. Prints are also sold to provincial film libraries, which are now being transformed into complete audiovisual centers (Centri Provinciali per i Mezzi Audiovisivi nell'Educazione). These centers are controlled by the provincial school authorities and financed by pupil subscriptions. According to the organization plan, 92 such centers exist, but their stages of development vary widely.

The schools have at their disposal approximately 5000 16mm film projectors, of which some 1500 are silent and some 3500 sound. There is a marked tendency towards the purchase of sound projectors. In principle, municipal school authorities are supposed to buy the projectors, but in many cases parent

organizations cover the costs. Films are generally shown in darkened classrooms.

There are no film supervisors or coordinators in the schools. The leaders of provincial centers are always headmasters, and they are partly relieved of other duties.

Teacher training in the use of audiovisual aids exists here and there on local initiative, but there is no general schedule for such activities.

Luxemburg

It would hardly be appropriate to speak of a pyramid of administration in a country like Luxemburg as parallel to, for instance, France, the Federal Republic of Germany, or the United States. The administrative structure of the centralized system in Luxemburg corresponds more to that of a regional center in some of the larger countries.

A special bureau of the Ministry of Education (L'Office du Film Scolaire) is responsible for the supply of educational films to schools and also for production of slides, so it may be considered as an audiovisual center. It is working with a budget of about $10,000.

About 350 film titles with some 4000 prints are available to schools. Since 1950, there has been a tendency towards the use of sound films.

The governmental center distributes the films free of charge directly to all schools in the country.

The schools have at their disposal approximately 150 16mm film projectors, out of which some 110 are silent and a little over 40 sound. The purchase of projectors is a responsibility of the municipal school authorities, and they do not receive any governmental support for this purpose.

Teacher training in the use of films is compulsory. It is given by the teachers colleges and includes both the technical and pedagogical aspects of the subject.

The Netherlands

The pyramid of administration has developed from the central level downwards. A regional level does not exist.

There is one central institution for the production and distribution of films to schools, the Netherlands Educational Film Foundation (Stichting Nederlandse Onderwijs Film). This institution is owned and administered by the three organized school systems of the country (the Catholic, Protestant, and nonconformist schools) and is governmentally subsidized.

Ten new film titles were released by the central institution in 1950; 21 titles in 1955. The number of film titles available to schools has grown from some 80 in 1950 to some 160 in 1955. Home productions are predominantly 16mm, silent, black-and-white and generally intended for elementary schools. Most of the imported films are sound, black-and-white, and intended for secondary schools. Color films have been introduced. In order to meet the demand, some 65 prints are needed of a silent film for elementary schools and some 15 prints of silent or sound films for secondary schools.

The films are distributed to schools under a subscription system based on a fixed contribution per pupil per year in the subscribing schools. The pupils themselves are not supposed to pay. At a slightly increased subscription fee, schools may also borrow silent projectors from the central institution.

Approximately 2750 16mm film projectors of which some 2600 are silent

and 150 sound, are owned by schools, and 470 silent projectors, owned by the central institution, are circulated to 1450 schools. Thus the total number of projectors used by the schools amounts to more than 3200. There is a growing municipal interest in providing schools with projectors. No marked tendency is visible as to any change in the proportion of silent and sound projectors. Films are shown in darkened classrooms or special film rooms. Daylight projection is not popular.

Audiovisual supervisors or coordinators do not exist in each school but only where several schools share one projector. He is always a teacher but is not specially remunerated for this work.

Out of 82 teachers colleges in the country, 22 have taken up audiovisual training in cooperation with the central institution. Methodology is taught by local teachers, and technical instruction is given by the central institution. Classroom practice culminates in a test, which is controlled by the central institution who gives a certificate to the trainee.

A new act, promulgated this year, makes audiovisual teacher training compulsory, and has also created greater interest to include the study of film expression and art in such programs. There is no organized instruction given by the central institution.

Norway

This country presents the most typical example of a complete pyramid of administration, developed from the local level upwards. Institutions on all three levels are operated directly or indirectly by the municipal authorities.

The central institution for production and distribution of educational films for ordinary schools acts as a branch of the Film Center of the Municipalities (Kommunenes Filmcentral), a joint organization for the municipally owned cinemas. A governmental film center exists also (Statens Filmcentral), responsible for supplying films to adult education, vocational training and certain specialized schools. There is close cooperation between the two institutions. A separate committee, acting as an advisory board to the Ministry of Education, grants educational visas for films to be used in schools. There is close cooperation between all three bodies.

There were 98 film titles granted edutional visas in 1950 and 238 titles in 1955. Imports dominate, and the proportion of home productions is between 10 and 15 percent of the total released. Some 300 film titles were available to schools in 1950, some 800 titles in 1955. There is a more and more marked dominance of sound films, and the proportion of color films is increasing. Ten prints of a film are normally sufficient to cover the demand, but sometimes this figure is considerably exceeded.

The educational film activities of the Kommunenes Filmcentral are financed from revenues on the commercial (cinema) side of the organization. The films are either rented or sold to schools or to regional and local film libraries financed and organized by the municipalities with the aid of government subsidies; only printing and expedition costs are charged.

The schools have at their disposal approximately 3100 16mm projectors, of which some 600 are silent and some 2500 sound. Purchase costs are carried by the municipal school authorities, which normally receive a 50 percent

subsidy from country authorities for this purpose. In new schools there are usually special film rooms. Most of the classrooms have no darkening facilities. Daylight projection is not practiced.

Although no standard system exists, there is normally one teacher who acts as film coordinator in each school. He is not specially remunerated for this work.

Teacher training in the use of audiovisual media has been compulsory since 1950, but training institutions are free to establish their own standards. Generally two hours are devoted to methodology and technical instruction. Classroom practice is given to future elementary school teachers. The Ministry of Education advisory committee arranges each year a three weeks' course for inservice teachers. Film expression and art are not included in such study programs.

Sweden

The pyramid of administration has developed from the local level upwards. On the central level there is no institution administered or supported by the authorities.

The production and central distribution of educational films for schools is undertaken by private enterprise, and several producers are active in this field. They do not receive any subsidies from authorities. Only a small number of films for teacher training have been partly sponsored by the Royal Board of Education.

Generally, some 40-50 new film titles are released per year, and imported films outnumber the home productions. Elementary schools enjoy a far richer supply than secondary schools, due to difference in demand. In total, some 1000 film titles are available to schools, and the Royal Board of Education edits an advisory catalog of films revised by evaluation groups. The previous dominance of silent films is rapidly changing into a marked dominance of sound films. The proportion of color films is growing. Some 100 prints of a film normally cover the demand of the elementary schools, whereas some 20 prints are mostly sufficient for the secondary schools.

The distribution of films to elementary (municipal) schools is normally done by selling prints to some 100 regional and 200 local film libraries administered and financed by municipal school authorities. Some regional film libraries receive subsidies from provincial authorities. Secondary (state) schools normally rent films directly from the producers.

The schools have at their disposal approximately 6000 16mm film projectors, about half silent and half sound. For the past couple of years, schools have bought only sound projectors. Local school authorities do not receive any special governmental subsidy for the purchase of projectors. In principle, films are shown in classrooms but very often also in natural science rooms or, in new schools, in special film rooms. Only rooms with darkening facilities are used, and daylight projection is not practiced.

Where there is no local film library, there are no special film supervisors or coordinators in schools or school districts. Almost all leaders of regional and local film libraries are teachers. They receive a restricted remuneration for this work but, contrary to school librarians, they are not relieved of any other duties.

Teacher training in the use of audio-visual aids is compulsory, but standards vary. Some five hours are normally devoted to methodology and technical instruction. Classroom practice is always given. Week-end courses and some longer courses are given each year for inservice teachers, arranged by the Royal Board of Education, teachers organizations, school inspectors and regional film libraries, often in cooperation with the producers. Film expression and art are normally not included in the study programs, but the interest in this subject is growing.

Switzerland

Education in this country is a responsibility of the provinces (cantons). The pyramid of administration has thus developed from the regional level upwards and downwards, but the production side is weak.

There is no central institution for production of educational films for schools. Productions are private and mainly sponsored by political, religious, or commercial organizations and sometimes by private commercial companies. Some films are, however, produced by the Association of Swiss Educational Film Centers (Vereinigung Schweizerischer Unterrichtsfilmstellen) and by regional film centers.

Some 50 new film titles, mostly imported, are released each year, and 400 film titles are available to schools through the film centers. The films are predominantly silent and black-and-white, but the number of sound and color films is increasing. At present, five prints of a film are sufficient to cover the demand.

Four regional film centers exist, two of them cantonal and two intercantonal. They are either administered or financed and controlled by the canton governments. The cooperative body of these four centers (the VESU) is officially recognized by the Conference of Directors of all 25 cantonal Departments of Education. The two intercantonal centers distribute their films on a rental or subscription basis, the two cantonal centers distribute free of charge. Contributions from canton governments vary widely, although they are never high (some canton governments do not contribute at all). Also municipal film budgets vary from nothing at all to insignificant amounts. This has led to a situation in which, although no contributions are in principle expected from the pupils, the most obvious budget gaps are sometimes filled by private sponsorship or collections.

The schools have at their disposal approximately 2000 16mm film projectors, of which some 1800 are silent and 200 sound. During the last few years, there has been a tendency in favor of sound. In some cantons, the municipalities may receive a governmental subsidy of 10 to 70 percent for the purchase of projectors. The films are generally shown in darkened classrooms or special rooms. Daylight projection is not practiced.

Only in some schools does a teacher function as film coordinator. He is then not specially remunerated for this work, but his position is similar to that of the school librarian.

Teacher training in the use of audio-visual aids is not compulsory but exists in several teachers colleges where some four to six hours are devoted to a general training. Local courses for inservice teachers are often arranged and in some cantons the film centers arrange more

extensive courses. Film expression and art are not included in the program.

United Kingdom: England and Wales

The pyramid of administration has developed from the local level upwards with some governmental support to an institution at the central level.

Two official institutions exist and work closely together with some staff in common. The National Committee for Visual Aids in Education has been established by the local education authorities and teachers associations. Its field of activity is educational policy. The Educational Foundation for Visual Aids (EFVA) is financed by the local education authorities but it has also received certain governmental subsidies. Its main activities are distribution and production. Distribution and production are also undertaken by commercial organizations.

No statistics are kept of the number of educational films for schools released each year, but in 1955 about 1700 titles from producers at home and overseas were available to schools through the EFVA. Most of these are sound films, and the number of color films is rapidly increasing. Some 30 prints of a film are normally sufficient to cover the demand.

Films are distributed in two ways. Some films are rented directly to schools, the rental paid for by the local education authorities. Prints are sold to regional or local film libraries, financed by the local education authorities, who distribute them free of charge to the schools in the area.

The schools have approximately 8000 16mm film projectors at their disposal (mostly sound projectors). The purchase of projectors is financed by the local education authorities. The films are mostly shown in darkened classrooms. Daylight rear projection is also widely practiced, though more with filmstrips than with films.

In some cases, the local education authorities have created a special post of "visual aids officer" to cover their area. In other cases, a teacher acts as coordinator without any special remuneration. Sometimes there is no coordinator at all.

Teacher training in the use of films is increasing in various forms, although it is not compulsory. Inservice teachers may receive training in courses arranged partly by local education authorities, colleges and universities, partly by some 200 associations called "Teacher's Visual Aid Groups." There is also a country-wide teachers association, with regional and local branches, that occupies itself with film expression and are under the term "film appreciation." This movement cooperates very closely with the British Film Institute.

United Kingdom: Scotland

The pyramid of administration has developed from the local level upwards. Central and local institutions are governmentally supported. A regional level does not exist.

Production of educational films for schools is undertaken by the Joint Production Committee of the Scottish Educational Film Association, and distribution by the Scottish Central Film Library. Both institutions receive subsidies for these activities from the Scottish Education Department.

Between 1950 and 1955, the Joint Committee produced 40 films, of which 31 were silent and nine sound, 20 in black-and-white and 20 in color. In addition to these Scottish productions,

the Central Film Library acquires films from governmental and commercial sources both at home and overseas. The total number of films available to schools through the distribution center was 2750 in 1950 and 3500 in 1955. Silent black-and-white films dominate, but the proportion of sound and color films is rapidly increasing. To cover the demand, some 20 prints may be needed of a silent film and some five prints of a sound film.

The films are rented directly from the distribution center to schools; prints are rarely sold. Regional or local film libraries hardly exist. Local school authorities do not keep a special film budget, but they receive from the Education Department a 60 percent subsidy for film expenditure.

The schools possess approximately 1400 16mm film projectors, of which some 1000 are silent and some 400 sound. The Education Department grants a 60 percent subsidy to school purchase of projectors via the local school authorities. Methods of projection vary: films are shown both in the classrooms and special film rooms, both in darkened rooms and on daylight rear projection screens. No film supervisors or coordinators exist.

Most future teachers are given audio-visual training by colleges in various ways. For inservice teachers, courses are arranged by local school authorities and local branches of the Scottish Educational Film Association. Film expression and art are not included as a special subject in the study programs.

United States of America

There is no country-wide pyramid of administration and conditions vary from state to state. In some states a pyramid has developed from the regional level downwards, in other states from the local level upwards.

The production and central distribution of educational films for schools is undertaken by private enterprise, and many producers are active in this field. They do not receive any subsidy from the authorities. University production of specialized films is increasing but as yet is insignificant compared with private production.

It has been calculated that between 1950 and 1955 some 2000 new educational film titles have been released each year. Approximately 10,000 film titles are available to schools, practically all sound films. The use of color films is rapidly increasing. Six hundred prints of a film for elementary schools is a fairly normal figure.

The producers sell prints of films to regional and local film libraries. In five states, regional film libraries are operated as a service of the State Department of Education. A number of state university film libraries are financed through rental of films on a revolving fund basis. Other regional or local film libraries are operated by local school authorities, sometimes with state government subsidies. In the latter case, the films are available free of charge to schools in the area.

It is impossible to calculate, even approximately, the number of 16mm film projectors at the disposal of the schools, but it is known that about 95 percent of the secondary schools and 80 percent of the elementary schools own one or more sound projectors. Silent projectors are hardly used. Most projectors are purchased out of school funds which are on state government budgets. In many

instances, however, the school parent-teacher organizations raise funds to buy audiovisual equipment. In principle, the screening of films takes place in the classrooms, but is restricted to special film rooms in some schools. Projection in darkened rooms is definitely preferred to daylight projection.

In most states, universities, larger cities, et cetera, there is a special post as director of audiovisual education. An increasing number of schools has someone who serves as audiovisual coordinator for the school. He is normally a teacher and is seldom remunerated for this work. There is, however, a definite trend in the direction of giving the coordinator some free time.

In only two states (California and Pennsylvania) is training in the use of audiovisual aids compulsory for teacher certification. Most teacher training institutions, however, offer basic audiovisual courses, and today some 30 percent of teachers entering their profession may be expected to have received such training. This percentage is increasing. The courses often include simple production techniques but very seldom film expression and art. A large number of summer courses are open to inservice teachers, and at least 50 institutions for higher education offer training sufficiently complete to qualify participants for posts as directors of audiovisual education.

THE EUROPEAN APPROACH TO AUDIOVISUAL RESEARCH—A CURRENT REPORT

Arthur Vesselo *

NOBODY SHOULD BE MISLED into thinking that what I propose here is some sort of comprehensive European survey. I am not really qualified to make such a survey, but I will add that there cannot be many people who are; and even if there were some ideal person who had it all at his finger-tips he would find it difficult, in a relatively confined space, to provide more than a series of jottings which *in toto* might not perhaps be very informative.

The first thing to note is that there is no coordinated body of European research. Europe is one continent but still many different countries—different politically, economically, socially, linguistically, educationally, and in tradition—despite all the relationships between them; each country accordingly tends to make its own autonomous approach to the use of audiovisual aids and to the research problems that arise. Some have done a good deal in the field of research, some relatively little, but, in addition, coordination *within* countries is often rudimentary and nowhere anything like complete. To attempt in any thorough fashion to pick up all the ends and knit them together into a coherent pattern would itself involve an elaborate work of research and exposition. It is not material for a short article.

On the other hand, there are certain important points which can be picked out and certain generalizations which can reasonably be made. For all the differences between European countries, there is also, it seems to me, a basic difference between the United States and Europe as a whole in the fundamental approach to the use of audiovisual aids, particularly in the educational sphere. While America cannot claim any chronological priority in the use, for example, of the film for documentary and educational purposes (some of the first big

* The author is associated with the Films Division of the Central Office of Information in London. He attended the 1959 Lake Okoboji Leadership Conference in Iowa where research was the major topic. Mr. Vesselo represented European audiovisual groups.

advances were certainly European), nevertheless the concentrated drive that has taken place in America over the last decade and a half towards the intensive application of every conceivable audiovisual means in every field of instruction has no real parallel on the European scene.

Europe vs. U. S. Approach

I do not mean that there has not been plenty of development in Europe also, but the attitude is subtly but without question different. In America there has been created a body of clearly-defined specialists (audiovisual directors) operating throughout the educational system; and the intensity of the drive, as far as mechanical devices are concerned, has been such that it is beginning to take on some of the characteristics of a thoroughgoing technological revolution in the realm of education. Things have not been going in quite the same way in the European countries.

In Europe new things are not, as a rule, seized on quite so avidly, as it were, for their own sake. Americans have acquired, in the course of their history, a tremendous and restless appetite for change and for technological development at the greatest possible rate and on the vastest scale. European methods tend on the whole to be more gradual, with a more elaborate adjustment between the old and the new—partly on general grounds (including a dash of scepticism) partly for economic reasons. The latter may often limit expenditure quite severely, and make careful control essential. The result, in the sphere of audiovisual instruction, has been a process of stage-by-stage assimilation, with considerable variations between country and country—also with much less emphasis on the creation of large numbers of full-time AV directors and staffs, and with a slower development of the more costly mechanical devices.

It might be thought that the more gradual, more cautious approach would automatically involve more detailed preliminary research. This does not, however, necessarily follow. Research requires facilities, and facilities are, to a large extent, a matter of the opportunities afforded by already existing practice. Research projects also have a way of being expensive. And they have a way, in the short term at least, of being at many points somewhat inconclusive. Money is more likely to be found for them among the converted or semi-converted than among those who "don't know" (and probably don't greatly care). But where money is short, the converted or semi-converted may prefer to spend it, if they spend it at all, on the development of practice (taking what may be described as a calculated risk), rather than on prolonged theoretical investigations.

If this is all true, then one would naturally expect to find more researches being carried out in America than in Europe. This is certainly so in general. On the other hand, as I have already made clear, there are great differences between countries. One country which has paid great attention to research into the use of AV methods in education is France. I know of no country where a more centralized and continuous effort has been made in this direction since the war. The body responsible for the planning and conduct of the researches is the Audiovisual Center of the Superior Normal School at St. Cloud

under Robert Lefranc. The Center was set up by the Ministry of Education in 1947, specifically to concern itself with (a) scientific research, (b) experimental production, and (c) dissemination of new AV methods (primarily within the teaching profession). Its basic purpose is the highly practical one of adapting suitable AV techniques to the particular needs of the French educational system.

Research Aims in France

Starting clearly from the premise that AV techniques in education are a good thing (research almost always starts from a fairly firm general conviction of this kind), the Center uses a variety of experimental methods to draw distinctions between techniques in particular contexts, to improve the effectiveness of the techniques in application, and to create "teaching norms." The aims of the research, that is to say, are discriminative, ameliorative, and system-finding. These aims are set out by the Center more specifically as follows:

1. To study the [ideal] pedagogical value of existing AV media

2. To study the value of the different AV media in relation to the present circumstances of teaching in France

3. To pursue a progressive improvement in the effectiveness of each AV medium

4. To work out a "doctrine of utilization" of audiovisual aids

5. To extend the use of audiovisual aids into educational fields as yet insufficiently exploited (for example, modern languages, mathematics, civics)

6. To perfect methods of inexpensive production.

This charting of tasks is interesting to note, even though there is unfortunately no room here to examine their significance in detail or to discuss the methods which are being used (pilot classes and control groups, questionnaires in various contexts, psychological and perception tests, etc.). Attention may be drawn however to (2) and (6) as indicative of a general trend. The Center is particularly concerned in relating its investigations to *actual* facilities and *actual* practice in France, and to think in terms of the most economic means available for given ends and given circumstances. It may be noted also that its operations in the realm of experimental production do, of course, tie up closely with its research possibilities.

Mention should be made, before leaving France, of the Schools Television Service (under Henri Dieuzeide), also run by the Ministry of Education through the National Pedagogic Institute, with which the Center has a close working relationship. The Service was the first of its kind in Europe (1951), though no longer now the largest, and therefore deserves a special word. It issues four half-hour transmissions a week, and about 4000 schools at present make regular use of them.

More recently both Great Britain and Italy have come into the field, each in its own rather different way (in Britain, for example, where a great deal has been done in the last two years or so, the service is not state-controlled, and is divided between the BBC and commercial television). An operation of this sort and on this sort of scale obviously offers most valuable material for trained investigators to check, examine, and test. And flourishing practice, as already observed, naturally stimulates speculation and research. In France, the

Center at St. Cloud takes full advantage of the existence of the Television Service in its research investigations and, further, the Institute is at present engaged in some closed-circuit experimentation at the Lycée in Sèvres in connection with the planning of programs more directly aimed at helping out the teacher shortage.

Much of European AV research activity takes the form of individual and temporary projects, undertaken under the auspices of particular educational institutions and authorities, or other types of organization, with particular purposes in view. The scope and status of such researches vary widely. On the university level psychological studies are often the clue. Sociological interests are also an important factor, and here we may very often find ourselves getting away from experimental research to "armchair" theory (I use the term in no disparaging sense; nothing is possible without a basis of well-argued and stimulating theory) and from organizations to individual theorists. The International Institute of Filmology (of French extraction) and its offshoots have given rise to studies ranging through psychology, sociology, even to philosophy—dealing most usually with the effects of the cinema upon the public, from one aspect or another, and having strictly educational implications only here and there.

Experimentation in Italy

A pioneer from the side of psychological analysis and experimentation is Italy. A recent UNESCO bibliography lists contributions by M. Ponzo on "psychological observations made during cinematograph presentations" and "the didactic value of the film" as early as 1911 and 1914 respectively. A good deal of valuable work in psychological and associated fields has been and is being done on the university level in both Rome and Milan. In Belgium there is some interesting current work on reactions to films by primitive populations: the sponsoring bodies are the Psychology Department of the Free University of Brussels and the National Trust for Scientific Research.

I could go on to make out extensive lists of learned and other investigations completed or in progress. If I do not do so, it is because I feel that this is not the place. Lists longer and fuller than any I could possibly supply here are prepared from time to time under various subject heads by the Clearing House of the Department of Mass Communication at UNESCO, which thus acts to some extent as a coordinating body. I say "to some extent" advisedly, since even the coordinating work of pure and simple bibliographic compilation (with names, dates, and basic references but without description or appraisal) is heavy, and it is evident that UNESCO (which also organizes occasional seminars and publishes certain descriptive reports) has not found the facilities to do it as thoroughly and continuously, and as analytically, as it ultimately requires.

This passing comment is indeed very relevant to the topic under discussion. It is an obvious first thought that the lack of coordination to which I referred at the beginning of this article could be remedied through the instrumentality of one or other of the international agencies which have existed since the war. But the problem is not so simple of solution.

Not only UNESCO but, for example, the European Productivity Agency, and lately the main body of OEEC (Organization of European Economic Cooperation) itself, have shown interest in aspects of AV research, but this interest may well be limited to a more or less particularized aspect at a particular time (and may perhaps tend to be schizophrenically split between practice and theory), or, alternatively, it may (as I feel with UNESCO) be *too* wide-ranging to be really effective within the limits of the manpower available. The fact is that a proper, solid, scholarly assembly of material from all quarters, kept continuously up to date in a useful form and disseminated where required, demands more organization (and cash?) than is at present available, and certainly requires a higher degree of working collaboration between center (whatever center) and periphery than seems possible under present conditions.

As far as this article is concerned, I can pretend to do no more than throw out a few ideas and pick out a few interesting highlights. I am making no attempt to apportion accurately according to importance, or even to include everything which is most important. I am trying merely to give a selective impression. And here I would like to diverge momentarily from research proper in order briefly to draw attention to an unusual venture which I think not altogether irrelevant.

In Ulm, South Germany, there is a college of design (Hochschule für Gestaltung), founded as a memorial to two anti-Nazi students, which includes a communication or information division —something quite novel in conception. As well as copy-writing, poster design, typography and so on, the division gives instruction in, for example, scripts for film and radio. It goes as deeply as it can into communication and information theory—in specifically scientific terms—with the well defined practical aim of getting away from "aesthetic" imponderables. This is not precisely a matter of research as such but it involves a way of thinking and working, for whatever it may be worth, which has lively potentialities for research developments in the future. And equally, if it is not directly related to the question of teaching by audiovisual means, it has a powerful indirect relationship. There is something here to watch.

British Efforts Individualized

I have said almost nothing so far about my own country, Britain. In Britain, research activities of several kinds have been taking place across a number of years, but in the main they have been of the nature of individual and not specifically related projects—some short-term, some longer term—but not on a continuing basis. There is as yet no effective center for the collection and collation of research information, though published reports appear in various places. Attempts have been made to start up such a center (I personally took part in one such attempt just after the war), but funds and a proper home for it have proved difficult to procure. There is a small Communications Research Centre at University College London; which may have future possibilities in our field, though currently its chief pre-occupation is with language. Meanwhile the first British Research Chair in Communication, endowed by Granada Television, at the University College of North Staffordshire, has just been filled—by a physicist.

Some useful experimental and analytic work has been done. Some of it has naturally emanated from the universities. An example of a few years back worth recalling—a small model of its kind for the care and detail put into its preparation and analysis—was the experiment carried out in 1944 in four Exeter senior schools (by G. Patrick Meredith, then at the University College of Exeter, now Professor of Psychology at Leeds) to help towards defining the respective provinces of visual and oral teaching methods. It was published in 1950.

At the present time the National Committee for Visual Aids in Education, the central promotion and procurement body for schools since 1948, is conducting some interesting experiments with AV aids for use in teaching backward children. Big industrial concerns have occasionally initiated inquiries of a limited kind. My own organization, the Central Office of Information, has a Social Survey division which has been responsible for one or two particular investigations and has published certain material on children and the cinema. I myself also handled recently (1958) for our Films Division an investigation into the comparative effectiveness of two kinds of short films for recruitment of schoolboys into the Armed Services. The approach was unpretentious (using the method of external observations in the context of the films' normal use—with questionnaires for the observers only) but results seemed genuinely helpful from the point of view of future production.

In 1954 Mary Field undertook, for the Carnegie United Kingdom Trust, an inquiry into children's reactions to cinema films, using the interesting technique of external observation by means of infra-red photography (backed up by other data). Researches into effects on children naturally bulk large in all connections and not only where AV aids in education are under consideration. Symptomatic is the very full report on *Television and the Child,* published in 1959 in book form, resulting from an investigation suggested in 1954 to the Nuffield Foundation by the Audience Research Department of the BBC and conducted by Hilde Himmelweit, Reader in Social Psychology at the London School of Economics, and some colleagues. (Note also that a new British Film Institute report, *Film and Television in Education for Teaching*—largely concerned, from the teacher's angle, with film and television as mass entertainment media—presses the need, among other things, for further audience research.)

Broadcasting, in particular television, is perhaps the one field in which there is anything like a continuous research operation, though largely angled in other directions than education as such. Of course there is a good deal of energy expended both by the BBC and its commercial television competitors (the latter with the aid of independent business research organizations) on the measurement of audience numbers.

Of considerably more significance for our present purpose is the type of carefully controlled before-and-after attitude-sampling operation conducted by the BBC Audience Research Department into television programs or series of programs on, for example, mental health. A body of valuable experience is thus built up. The schools services also have

their system of regular feedback from the classroom, though as it stands at present this is not quite "research" in the full sense. In the broadcasting sphere in general one sees the possibility of a genuine interchange of research views and data in the long term between European countries through the medium, for example, of the regular meetings which take place between members of the European Broadcasting Union.

I offer my apologies to all those whose names or work I have omitted to mention. I want to finish this all too sketchy account by the briefest of words about the future of research. It is obviously essential that some means shall be found of establishing fuller and more systematic contacts between research workers not only all over Europe but all over the world. Only so will it be possible to establish a satisfactory framework for future development. At the same time some attention must be paid to basic priorities for development. It must never, of course, be forgotten that AV research is not a thing in itself but must always be related to the main aims of education as a whole.

Character of Research Questioned

Starting from here, I would like to record my own strongly held view that one of the first things to be done on any scale is to investigate thoroughly the character of research itself—to classify its methods and techniques, to determine which of them are most appropriate to what types of problem, to examine into the degree of scientific accuracy possible in given contexts, and to specify safeguards. (To make one simple illustrative point here, the questionnaire, most popular of research instruments, is in fact a very rough-and-ready — perhaps too ready — device, open to error at many points, and requiring more cautious handling than it usually gets.) Under present conditions too much quasi-research takes place, too few "results" are authentic. Even where methods are impeccable, summary conclusions drawn (by the researchers themselves) may be wildly misleading. Interpretation of results has, itself, major difficulties which have to be clearly recognized.

One of the biggest of all pitfalls is to strain after "scientific" certainty where it is simply not obtainable. There is nothing whatever wrong with an investigation which aims merely at the greater clarification of a working hypothesis. Indeed "merely" is too derogatory a word. What thought-advances are ever possible, without proceeding, by all available means of controlled observation and experiment, from one working hypothesis to another? For that matter, what thought-advances are possible without a background of pure "armchair" speculation, providing ideas to be tested?

In our field there is much that is, and will long remain by its very nature, highly indeterminate. This need in no way limit our explorations. But let the admission of it guard us against the besetting sin of claiming scientific certainty for findings that have not in reality satisfied the canons of rigorous scientific proof. And, in passing, when we hear somebody affirm that "it has been conclusively demonstrated that . . ." let us reach, if not for our pistols, at least for our hats.

A REPORT ON SIX RESEARCH STUDIES

Eugene K. Oxhandler

Dr. Oxhandler who also writes on page 109 reports here on a session conducted during the 1960 Convention of the Department of Audio-Visual Instruction at Cincinnati in March. C. Walter Stone, director of the Educational Media Branch, U.S. Office of Education, gave a brief introductory address followed by the progress reports summarized here. Kenneth D. Norberg, departmental editor for AUDIOVISUAL COMMUNICATION REVIEW, *was chairman of the session.*

TRACING THE DEVELOPMENT and implementation of Title VII (National Defense Education Act), Dr. Stone explained briefly that Part A calls for research in the newer educational media while Part B deals with the dissemination of these research findings and information. Included under the area of research are studies on the use and/or adaptation of the newer educational media for instruction, the training of teachers, and a newer approach to the presentation of subject matter. Dissemination contracts include surveys, studies, and publications which will tell the story of instructional materials research as well as developing leadership in audio-visual instruction.

Approximately one-half of the projects funded by Title VII relate closely to television. The second largest category deals with the development of new materials and newer systems of instruction. The third major group, now rapidly increasing, is concentrated in the area of research on teaching machines. As an aside Dr. Stone indicated that many industrial concerns are inquiring about teaching machines, companies which themselves have developed the "hardware" for teaching machines but are in need of educational programming.

Dr. Stone foresees these major developments for the future:

1. A national training laboratory for leaders in the instructional materials field.

2. A nationwide demonstration and display center.

3. A national research information agency to collate, organize, abstract and distribute research findings.

4. Coordination of both national and regional efforts to develop, experiment with, and exchange instructional materials.

5. An increase in the improvement of instruction as it relates to teaching, research and administration.

6. A national statistical inventory.

7. A greater impact of the newer educational media on national programming and planning.

8. The development of regional research centers.

Dr. Stone concluded with the remark that American education faces great change, and that in the center of this change will be the audiovisual educators who will be called on to provide "more and better learning for more people in less time."

Progress reports limited to six minutes each by the chairman revealed the following developments:

John R. Brugger reported on *A Survey of Television Equipment and Facilities Used for Purposes of Instruction by Public Schools, Colleges and Universities* (Washington County Public Schools, Maryland). Mr. Brugger listed 13 achievements TV can bring to instruction, among them, the efficient use of a specialist, bringing outside events into the classroom, directing student attention through camera application, and so on. Three basic types of installations were discovered to be in use, namely, standard broadcast stations, closed-circuit systems, and demonstration amplifiers. The types of programming ranged from training TV personnel to direct instruction in the classroom and included general information programs broadcast as a public service.

As Mr. Brugger sees the problem, educational television will need: (1) an aesthetic and artistic approach to maintain equality with commercial television; (2) special training and assistance for the television teacher; (3) trained, experienced technicians, including cameramen, communications specialists, graphics men, and others, and (4) an educated viewer (the student as a critic).

Basic deterrents to good programming are lack of funds for staff, lack of release time for the television teacher, and the expenditures of time and materials needed for good production.

The trend, according to Mr. Brugger's survey, indicates that television will help improve education both qualitatively and quantitatively.

Carolyn Guss reported on *A Study to Determine a Feasible Method of Establishing Bibliographic Control of Educational Audio-Visual Materials for the Purpose of Informing Teachers Concerning Available Materials and Their Educational Utility* (Indiana University). To accomplish the purposes of the study, the following steps were taken: (1) an inventory of all tools and information on newer media was made, (2) sources of information were listed and checked, (3) persons interested in improving and creating new means were contacted, and (4) recommendations were solicited and made.

Five compilations of lists were consulted and a working bibliography of 117 items was circulated among 149 qualified people along with a questionnaire asking for additions and corrections. The list is now being revised according to the 100 replies received.

The following set of criteria for the audiovisual sources bibliography has been established:

1. No items dated prior to 1950 shall be included.
2. Items will stress the newer media.
3. Materials for elementary and secondary teachers will be stressed.
4. No film or AV library catalogs will be listed.
5. No producer handouts.
6. All publications where the supply is definitely limited, obsolete, or out-of-print will be eliminated.

The investigators have already annotated over 100 sources of information to provide background on the newer media for instructional purposes. Miss Guss reported that the completion of Phase One of the study should be accomplished by March 30, 1960.

Walter T. Martin of the Institute of Community Studies, University of Oregon, presented a progress report on *The Study of Resistance to Television for Educational Purposes.* The study was set up in a three-year pattern utilizing an interdisciplinary social science approach. The first year is designed to investigate the habits of TV viewers, ascertaining what types look at educational television, and so on. The interview method will be used with 500 male and 500 female adults as subjects. The second year will include sub-studies of controlled manipulation of both production and viewing of ETV. During the third year, the original 100 viewers will be interviewed to determine changes in their patterns of behavior.

The study is now localized in Eugene, Oregon and the 1000 persons have been randomly selected from a group of 4500 families who receive four commercial and one ETV stations via co-axial cable. This pattern insures equal pictorial quality on all five channels thus eliminating the variables of picture quality, and other factors. At present, less than half of the 1000 subjects have been interviewed and no compilations are as yet available. However, the researchers report asking significant questions and receiving replies of both theoretical and practical importance.

Herbert Schueler reported on the Hunter College experiment in *The Use of Television for Improving Teacher Training and for Improving Measures of Student Teaching Performance.* The assumption is that closed-circuit television and videotape will improve teacher training.

Phase One, the student teacher phase, allows the student teacher to watch herself in action through kinescope recordings. The experiment including 24 volunteer student teachers has one control group with a supervisor, a group of student teachers who are supervised solely by kinescope recordings, and a third group who have both supervision and kinescopes. A set of testing instruments are being developed to (1) determine what is good teaching and (2) measure this good teaching as practiced by student teachers. It is hoped that repeated showings of teacher-pupil reaction will aid in developing these instruments. Four elementary classrooms are now equipped for transmission. The TV intrusion is minimized by remote control procedures. Cameras are set at bulletin board level on the sides of classrooms and on shelves. Two cardiod microphones, angularly placed, are used for classroom pick-up. Extra banks of fluorescent lights are provided for added illumination.

The second phase is an attempt to determine whether elementary methods courses can be improved by the use of edited television recordings of child observations. The viewing rooms are so set up that the instructor can control the observation. Dr. Schueler stated that the study planned to develop over 1000 kinescopes of good teaching practices. He also said that the human factors are now positive and that student teachers like the process very much.

An Experimental Study of Patterns for Improving the Preparation of Pre-Service Teachers in the Use of Audio-Visual Materials and of the Effects of Optimal Use of Audio-Visual Materials upon Pupil Learning and Teacher Use (Pennsylvania State University) was reported on by G. M. Torkelson. The study is divided into four main patterns with students randomly divided into: (1) a separate course in AV; (2) an integrated course with both elementary and secondary methods; (3) a course given as part of student teaching both saturated with equipment and materials and non-saturated; and, (4) self-teaching.

Testing materials including performance and attitude information, five kinescopes, and an entire self-taught course have been developed during the first semester of operation. At present, those students who have experienced the self-teaching pattern have expressed a distinct liking for this procedure. Their test scores indicate that there is a significantly higher level of performance on certain projection equipment than that resulting from other patterns. There were no significant differences among patterns as to the effect of informational or theoretical applications of audiovisual instruction. It was pointed out, however, that the first semester's work was a "dry-run" situation with revisions suggested for succeeding semesters.

The final phase of the study will be a follow-up of all those pre-service teachers who eventually take positions in Pennsylvania. Measures will be developed to assess the utilization of audio-visual materials made by teachers who have been exposed to the various patterns and of the obstacles to the use of these materials in the public schools.

Edgar L. Lowell presented a summary of *An Investigation of Audio-Visual Techniques to Improve the Parents' Role in the Education of Deaf Children* (John Tracy Clinic, Los Angeles). As stated by Dr. Lowell, the basic objectives of this research is to evaluate audiovisual methods for influencing parental attitudes toward education. The population is being drawn from pre-school deaf children and their parents.

The major variables are: (1) parental information and readiness to accept change, (2) parental feelings as a component of attitude changes, (3) the relative prestige of a "Hollywood" celebrity as opposed to an "expert" in the field, and (5) the use of films, tape recordings and printed materials.

At present, tests are being constructed to measure attitude changes. The population is cooperating excellently as are the "Hollywood" personalities and the film and TV studios.

Oliver L. Lilley of the School of Library Science, Columbia University, told of the progress he is making on a *Feasibility Study Regarding the Establishment of a New Educational Media Research Information Service*. Many samples have been checked in this study

in which Dr. Lilley is investigating the adequacy of present bibliographic control. Among periodical indexes, the *Education Index* proved the best while *Psychological Abstracts* rated high among abstracting journals. In most cases, the bibliographies were quite incomplete. With the search of 25 tool controls, 17 percent of the newer educational media were not even listed. Many duplications of listings were also discovered.

Results of a questionnaire indicated that most people looking for information rely most highly on personal communication and only slightly on libraries. Most standard resource tools are either not known or known but not used.

The study indicates that short informational abstracts and critical evaluation summaries are desired most by researchers. Multiple services and both broad and narrow approaches to the search for materials are probably needed. Dr. Lilley expected the final report to be printed by May 15, 1960.

SOME SUGGESTIONS REGARDING THE PREPARATION OF RESEARCH PROPOSALS

Warren F. Seibert
and Kalmer E. Stordahl *

IN SOMEWHAT less than two years of operation, the educational media research program authorized in Part A, Title VII, National Defense Education Act (P.L. 85-864) has provided financial support to 81 new research projects. These projects were selected from 421 proposals formally submitted prior to the September 1959 deadline and when each of the approved projects is completed, they will have received Federal grant funds totalling approximately $6,120,000.

Although there are no clearly identifiable "secrets of success" for preparing proposals there are some important policies to be considered in applying for a research grant. One of these, as already implied, is that to date only the grant research provisions of Title VII have been activated; contractual authority for the support of research has not been implemented. Grants are awarded only to public or non-profit private agencies or organizations (colleges, universities, public school systems, state

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departments of education, or other nonprofit agencies). Although the Act also authorizes the Office of Education to make grants to individuals, at present it seems likely that grants will continue to be made only to the institution or agency with which the individual applicant is affiliated.

With respect to equipment the Title VII policy seems essentially to be "middle-of-the-road." It does not permit Federal support for permanent installations, structural modifications, and so on, but it does provide limited support for new and "portable" equipment (for example, a film projector or TV receiver) which is otherwise unavailable but which is necessary for the satisfactory completion of an approved project. Support may be provided at the rate of 20 percent of undepreciated equipment value for each year of use in the project.

Support for indirect costs of a project can be included in a grant so long as this does not exceed 15 percent of the Federal funds granted for support of personnel, services, supplies, and other direct costs. For example, if an approved project called for $50,000 of Federal funds to support direct costs, an allowance of $7500 could be made to cover at least a portion of the indirect costs (for example, for space, heat, power, and general administration).

A small grants program has recently been established as a part of the Title VII research activity. The principal purposes of this program are to encourage small-scale pilot or exploratory studies and to encourage more active participation in media research by young or less experienced researchers, including graduate students. In general, the policies and procedures of the new small grants program will be the same as those of the larger program; however, small grants will be limited to projects having a duration of one year or less and requiring Federal support of no more than $2500.

In preparing a research proposal, the applicant should observe insofar as possible the instructions prepared by the Office of Education. Copies of these instructions and of other pertinent materials can be obtained by addressing a request to the Director, Educational Media Branch, U.S. Office of Education, Washington 25, D. C. It is especially important to examine carefully and bear in mind the five criteria used in the evaluation of each proposal. These are (1) relevance to the purposes of Title VII, (2) educational significance of the problem(s) to be studied, (3) adequacy of research procedures, (4) qualifications of key personnel and adequacy of available facilities, and (5) economic efficiency.

Two proposal submission deadlines were established for calendar year 1960; the first was February 1; the second is August 1. Proposals meeting the first deadline were considered by the Title VII Advisory Committee at its May meeting; decisions concerning proposals that meet the August deadline will be made when the Committee convenes in the fall, probably in late October or early November.

■ FILMS

Twyford, Loran C.

"Operations Research on Instructional Films." *Journal of the Society of Motion Picture and Television Engineers* 68:375-78, June 1959.

Purpose: To integrate film research findings into a form that can assist in the planning for new film types and new equipment that will most adequately meet the needs for instructional films.

Procedure: Factors in the design, production, and utilization of instructional films were listed and evaluated subjectively for their relative importance. Instructional film and television research provided the guidance for evaluating the relative importance of *media factors* such as sound, picture, motion, and attractiveness; *production factors* which include complicated production, costs, types of production, and low-cost production; and *utilization factors* which include use of films for essential instruction, filmed courses, room darkening, film rental cycle, and projector limitations.

Results: (1) Sound or verbal material in a film appears to be more important than the picture or visual presentation providing motion. (2) For the most part, attractive devices in instructional films can be eliminated. Low cost sound film recordings can be very effective. (3) Providing motion in a film increases production costs and complexity. The high cost of films can best be justified when the films are used for essential instruction rather than as aids. (4) Using a film is not an easy operation. Obtaining a film involves an excessive amount of intercommunication. (5) A model instructional film system would be ideal. This would involve a simplified projector and inexpensive films that could be produced locally. Films should have greatly expanded use for essential instruction. —L. TWYFORD

Wittich, W. A.; Pella, Milton O.; and Wedemeyer, C. A.

The Wisconsin Physics Film Evaluation Project. Madison: University of Wisconsin, 1959. 30 p.

Purpose: To determine the effect of the Harvey White physics film course on students' and teachers' learning of physics. To study the opinions of students and teachers toward using the series of films as part of the regular class instruction and to discover whether an interest in science was developed.

Procedure: One hundred sixty-two 30-minute film lessons on high school physics were used in the study. Eighty-three schools participated in the study and were divided into an experimental and a control group and another control group to check on any possible "Hawthorne effect." Lesson outlines were prepared for students and teachers; a number of tests on knowledge of physics were administered to and obtained from both.

Results: A test which included text and film items showed no significant difference between experimental and control

groups. The experimental group was superior in learning film-only items. The Ohio test scores were no different. The control group retained more after three months. The "Hawthorne effect" appeared to increase the score of the control group. The training of teachers was directly related to test scores. The more credits a teacher possessed the more he learned. Teachers learned a significant amount from using the film course. They felt the films were excellent but they did not wish to step aside for the "film teacher." Student opinions were varied. The experimental group had more interest in science but did not look forward to seeing the films. —L. TWYFORD

■ SOUND FILMSTRIPS

Dworkin, Solomon, and Holden, Alan

"An Experimental Evaluation of Sound Filmstrips vs. Classroom Lectures." *Journal of the Society of Motion Picture and Television Engineers* 68: 383-85, June, 1959.

Purpose: To find out whether the sound filmstrip is a good substitute for the classroom teacher.

Procedure: Four sound filmstrips on the subject of atomic bonding were produced. They were shown to one group while a second group was taught by the regular classroom lecture. One hundred twenty graduate engineering students made up the two matched groups. Each of the four filmstrip lectures contained about 150 frames and ran for about 50 minutes. The teacher who gave the classroom lecture also wrote and recorded the filmstrip scripts. Sound was recorded on an inexpensive tape recorder. An examination and questionnaire were administered after the four presentations.

Results: There was no significant difference in learning between the two methods of teaching. Matching of groups was adequate. The rate of delivery of material was felt to be too fast. Forty percent indicated they would like to ask questions; 75 percent were willing to accept sound filmstrips for instruction. However, this result may apply only to graduate engineering students. It was concluded that sound filmstrips might be substituted for more expensive films or television and that other methods such as reading assignments might be substituted for the classroom lecture. This study confirmed previous research studies which indicate that elaborate production methods, including color, are not necessarily needed for effective learning. —L. TWYFORD

■ TELEVISION

Carner, Richard L.

Teaching Reading Through Closed-Circuit Television in the Elementary School. Division of Education Communications, New York State Education Department, Albany, November 1959. 11 p.

Purpose: To determine the effectiveness of teaching reading at the elementary level through closed-circuit television.

Procedure: Reading was taught over television three times a week for 28 weeks. The experimental group was made up of 198 pupils in the fourth and sixth

grades and the control group of 160 pupils. Growth in reading was measured using two forms of the Iowa Tests of Basic Skills. A questionnaire was given to study attention span, reaction to talkback, degree of interest in the lessons, amount of free reading, and word attack skills. Teachers used materials produced or created for their telecasts as well as commercially prepared materials.

Results: The television group was found to do significantly better than the control group in spite of the fact that the control group appeared to be significantly superior intellectually. Vocabulary was more improved than comprehension. A 30-minute telecast is probably more adequate than the 20-minute one. The questionnaire seemed to indicate that the pupils felt that television was a valuable educational medium.

—L. TWYFORD

Murnin, Joseph A.

The Development and Evaluation of a Low-Cost Closed-Circuit Instructional Television System: The One-Camera Television Chain. Technical Report NAVTRADEVCEN 5-11-1. Research by The Pennsylvania State University for the U. S. Naval Training Devices Center, Port Washington, New York, December 18, 1958. 90 p.

Purpose: To develop and evaluate a low-cost closed-circuit educational television system for application to mass military training. The system was to employ a single vidicon camera chain and enough receivers to instruct 400 trainees. It was to be kept sufficiently simple so that operation and maintenance could be handled by personnel normally assigned to a training command. The research was directed toward finding a practical and effective application of television for instructional purposes which would (1) have the advantages of increased size and extended use of good instructors; (2) provide a greater incentive for improved instruction; and (3) include the use of training aids. No change was contemplated in the content of the course to be taught. Plans called for some comparison of academic achievement. The study was to obtain some indication of acceptance by administrators, instructors, and trainees in terms of interest, motivation, criticisms, and attitudes toward televised instruction.

Procedure: The Indoctrination Curriculum of the Recruit Training Command, Bainbridge, Maryland was selected for the research. Fifty-seven lessons which are normally non-visual were chosen. A single camera fed a signal to an audio-video mixer and the RF signal was sent to four classrooms, each having three 24-inch receivers. A zoom lens and a lavalier microphone were used. Four 750-watt spots and two fluorescents provided 200 foot-candles of light. The total cost of the installation was $7,872. Regular personnel operated the equipment and put on the lessons. The one camera was directed to the instructor, visual display table, overhead projector screen, or the motion picture screen as required by the lesson. A regular projector with the shutter removed projected a satisfactory picture on a rear-projection screen for television transmission. A number of visual aids were adapted to television use. A total of 11,175 student-hours of televised instruction was presented during one week. Multiple-choice test items were given to experimental and control groups selected at random. All persons involved in the project made subjective evaluations.

Results: The low-cost, closed-circuit, one-man television system was shown to be effective. The technique of using a single camera to provide transitions from scene to scene makes the system practical for instructional purposes. Four companies of recruits can be taught simultaneously and additional companies can be added for little extra cost. Station-wide coverage appears to be feasible and would permit moving

the instruction rather than the men. Normally assigned personnel with no prior experience can be trained to operate, maintain and instruct in a brief time. Thus, only an instructor and cameraman are required to present a complete lesson. A standard sound projector with the shutter removed provides a convenient and inexpensive television film projector. The entire Indoctrination Curriculum can be adapted to television. Instructors see the advantages and prefer televised instruction. No differences were found in achievement scores. —L. TWYFORD

The Fund for the Advancement of Education

The National Program in the Use of Television in the Public Schools. A Report on the First Year 1957-58. 477 Madison Avenue, New York 22, January 1959. 89 p.

Purpose: To discover whether television can be used to teach very large classes at substantial savings in classroom space and in teaching positions while at the same time improving the quality of education.

Procedure: Superintendents of large city school systems were contacted and a nation-wide experiment was set up involving 40,000 students in more than 200 elementary and secondary schools. Thirteen experiments were undertaken. Television classes were usually held in the school auditorium. The elementary classes normally spent half a day in small groups and the other half in groups of 75 to 150. In junior and senior high school classes the television instruction was usually limited to a single course. Achievement was measured by standardized tests.

Results: Of the comparisons between control and experimental groups, 68 favored television and 42 favored control classes. Where the differences were significant, 29 were in favor of television classes and nine in favor of the control groups. Television proved to be valuable for inservice training of teachers. Several school systems reported substantial savings. Dade County estimated a savings of $250,000 on cutting the employment of teachers by 60. However, there were major problems involved, among which are inadequate facilities, finding good television teachers, training teachers in handling large classes, integration of the telecast, and scheduling. —L. TWYFORD

■ TRAINING DEVICES

Tufts College

Coordinate Index and Abstracts of Training Device Literature. Abstracts prepared by Tufts College Institute for Applied Experimental Psychology. Coordinate Index prepared by Documentation Incorporated, NAVEXOS P-1735. U. S. Naval Training Devices Center, Human Engineering Department, Port Washington, New York, December 4, 1957. 212 p.

Purpose: To abstract all technical reports and research studies related to the theory, design and use of training devices and audiovisual aids from 1950 through 1955. In order to facilitate comprehensive searching of the abstracts, the bibliography was to be published in a form especially designed for the use of multiple cross-referencing.

Procedure: Tufts College developed a classification system for relating research in various fields. Sixteen hundred

abstracts were prepared from the research articles and bulletins. Each abstract contained about 80 words and included important words related to the content. In addition each abstract was accompanied by a citation of author, title, contract number, report number, date, pages, and source. After considering several methods for retrieving information from the bibliography, a coordinate index was selected.

Results: About 70 percent of the unclassified literature for the period was abstracted. The 1600 abstracts and citations were published in a book with the coordinate index. To find a research article dealing with color in posters, for example, one compares numbers under the word *color* with those under *posters*. Reports were also listed by sources and authors.

—L. TWYFORD

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